

*The*

OCTOBER 1942

# TOOL ENGINEER

MACHINERY

• PRODUCTION

• TOOLS



## Vanadium-Alloys

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*Official Publication of the American Society of Tool Engineers*

# Gangway, Goering

## Here Comes Our Gang

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This is a gang of six Pratt & Whitney staggered-tooth milling cutters, mounted on one arbor and really putting the bite on a chunk of war production work.

Ripping off the chips, yes, but *accurately*. Like all P&W small tools, these cutters were shaped, hardened, sharpened, and selected for their jobs with as much care as the R.A.F. puts into a raid.

Wherever the goods of war are a-building in America, there are P&W tools at work . . . and that likely includes *your* plant too, Mr. Reader. So get this: *don't spare the pressure* . . . your P&W tools can take it. Keep 'em cutting; there are more where they came from. We're making them, and you're working them, twenty-four hours a day.

Coolant streams not yet adjusted, but we're wheeling! Cutters walk right through the work . . . will be ready to tackle the next piece in jig-time.



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Split-second later, the first splash of oil hits the tools, but hasn't yet covered the job.







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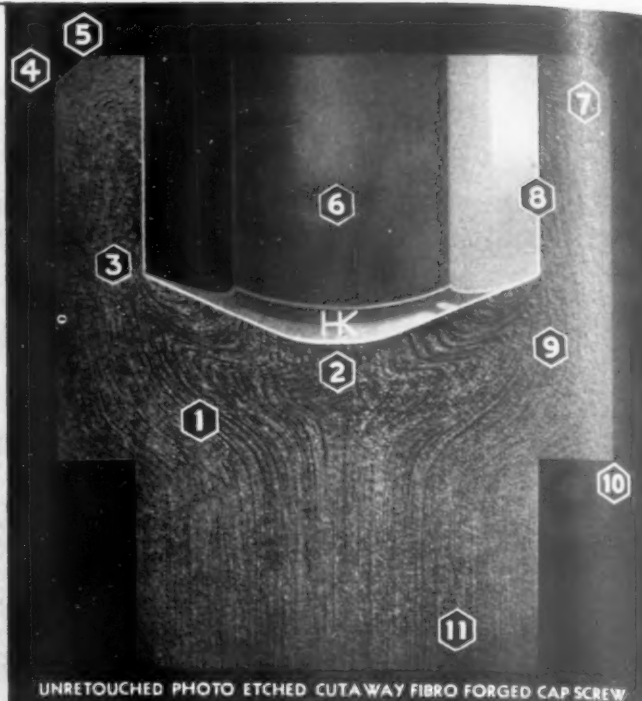
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# THE TOOL ENGINEER

Volume XI

OCTOBER, 1942

Number 10

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THE TOOL ENGINEER covers tooling and production of aircraft parts on two coasts, telling about Wright's method for increasing tool life 2000% and Northrop's development of heliarc welding.

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**THE TOOL ENGINEER**

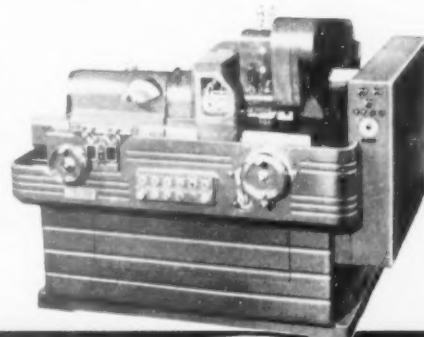
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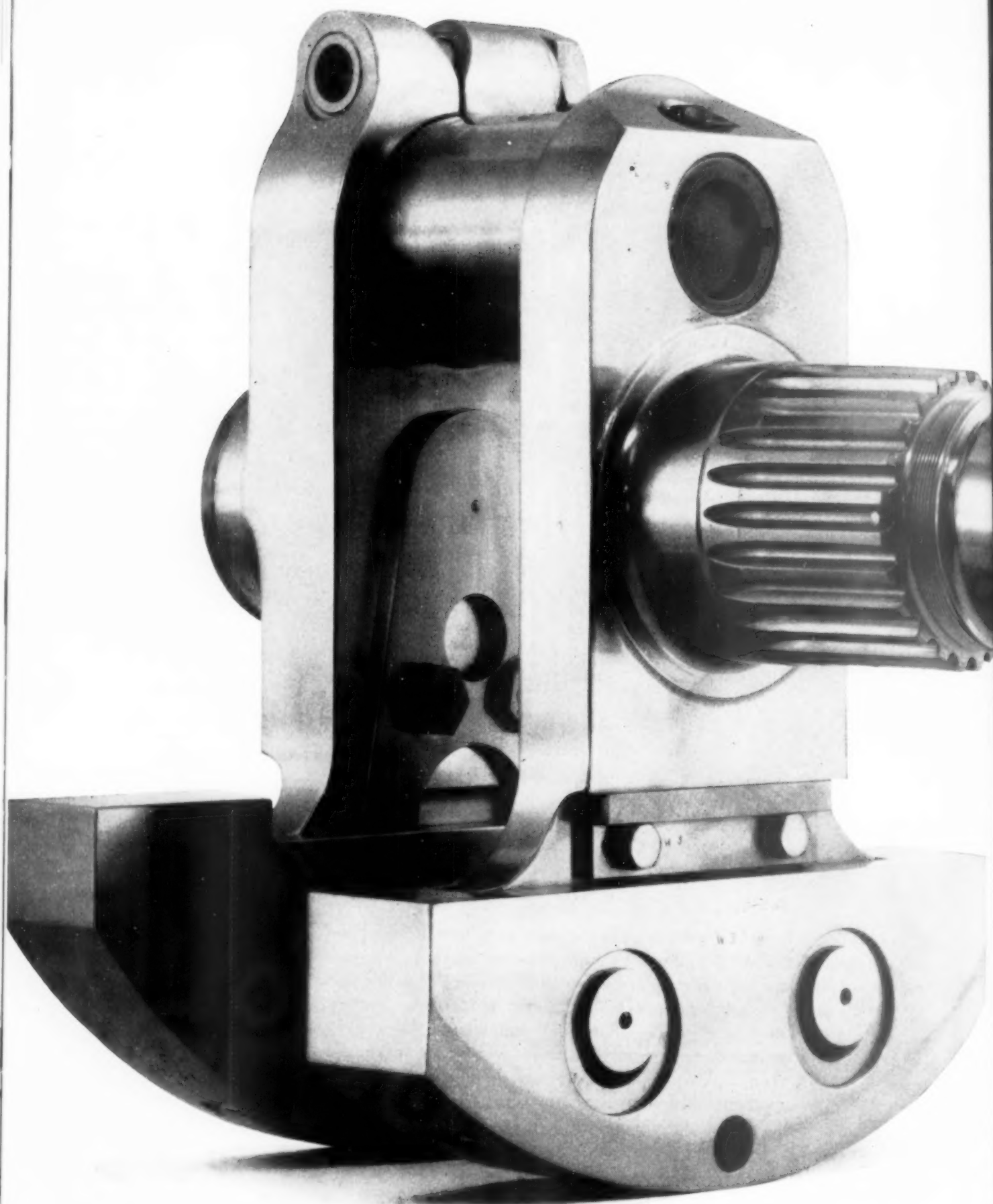
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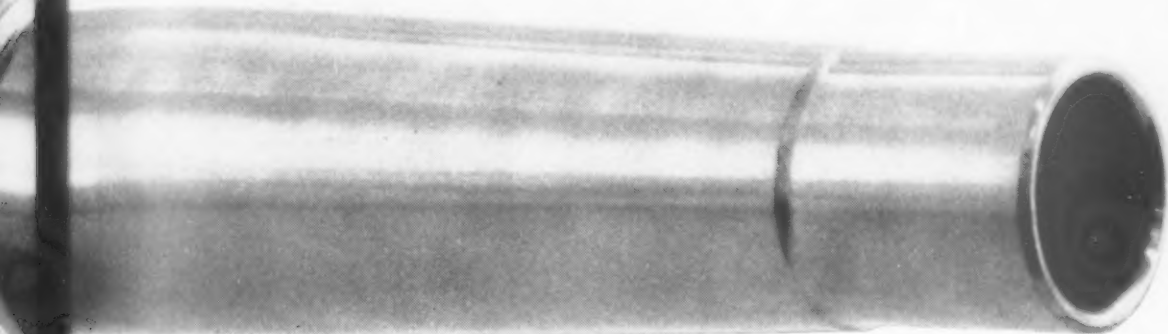


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to keep 'em interchangeable  
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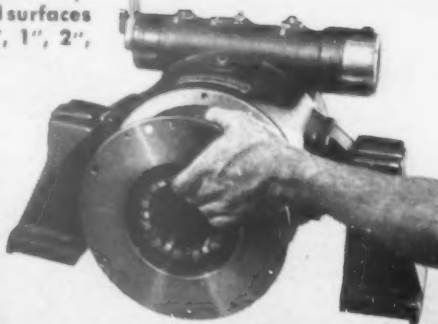
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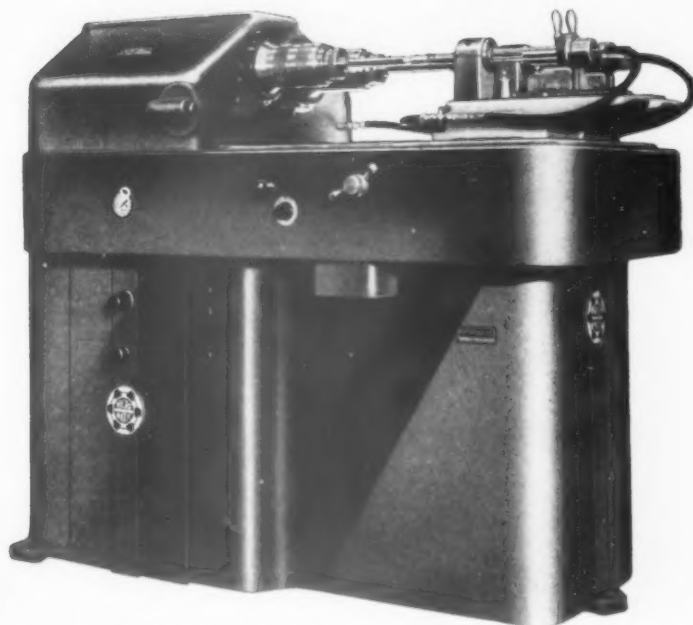
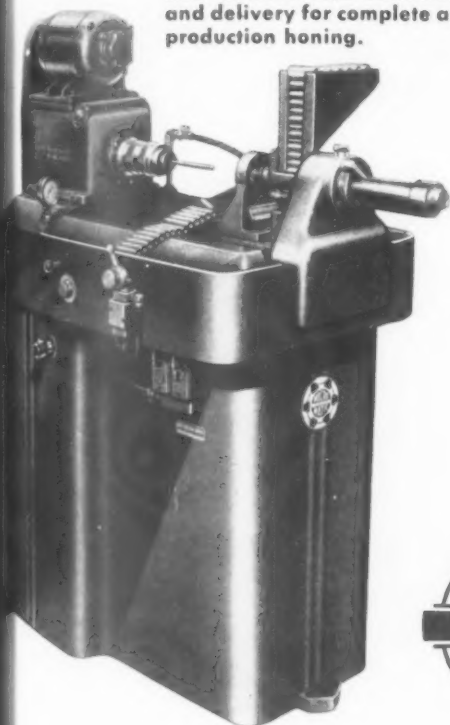
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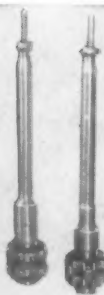
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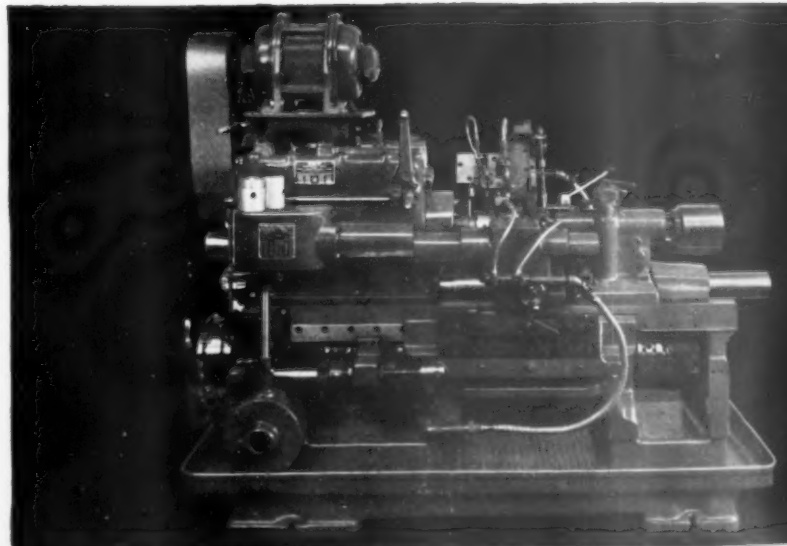
# Every modern soldier



**B**Y the end of 1863, complaints from infantry in the field kept coming to Colonel Benton at the Springfield Armory. Cartridges dipped in tallow gathered grit, scoring rifle barrels, causing locks to jam in emergencies. Could the ordnance department find a way to lubricate bullets without covering the whole cartridge with sticky grease? The answer came from Albert Ball of Jones & Lamson. He produced a machine which put grooves in the bullets. The bullets were greased in these grooves, and the grooves covered by the end of the shell when loaded. Ever since then, service cartridges have been dry, and the bullets lubricated by grease in grooves which are not exposed until the cartridge is fired.

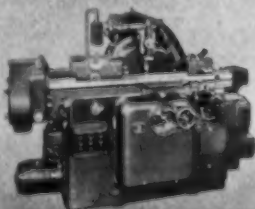
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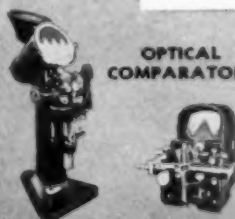


Jones & Lamson 12" Fay Automatic Lathe tooled to face, groove and cam turn automobile pistons.

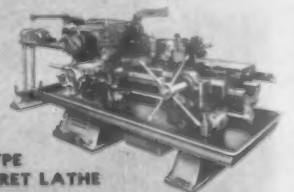
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GRINDERS



OPTICAL  
COMPARATORS



RAM TYPE  
UNIVERSAL TURRET LATHE





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**A**LBERT BALL'S solution of Colonel Benton's problem was neither the first nor the last of hundreds of such problems overcome by Jones & Lamson engineers and by their predecessors.

Ever since 1833, in the early shops at Windsor, and since 1888 in factories still expanding at Springfield, generation after generation of machine builders has been working in continuous succession. Through more than a century they built up an accumulation of knowledge that forms a background for the rapid, far-reaching developments that characterize the work of Jones & Lamson engineers.

Thus today, Jones & Lamson engineers

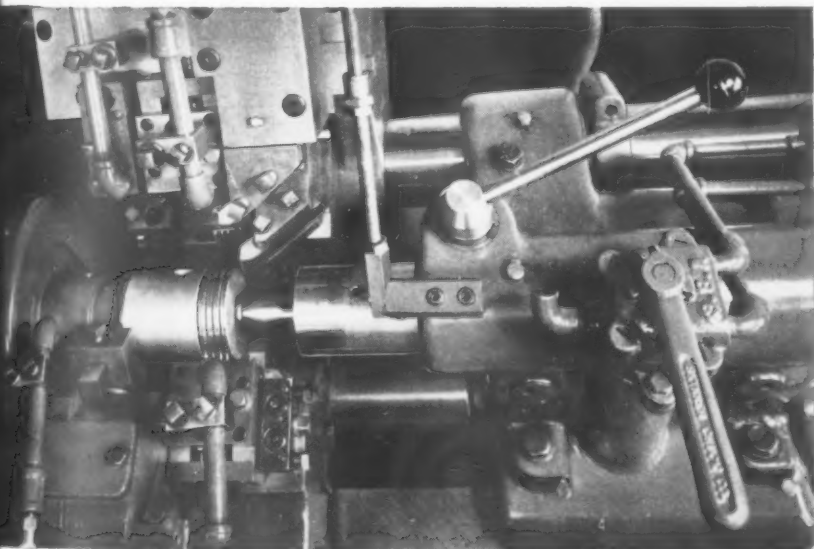
are called upon in turn to design and equip whole new factories for mass production — or to take the kinks out of a single job like the one pictured here.

Time is saved by cam turning while facing and grooving pistons on the Fay Automatic Lathe — grinding time is reduced to a minimum.

Whether your plant is large or small, your production problem big or little, it pays to write for help to Jones & Lamson engineers. With Jones & Lamson equipment you can meet today's wartime demands and still be ready for the hard years ahead. Illustrated catalogs are available.

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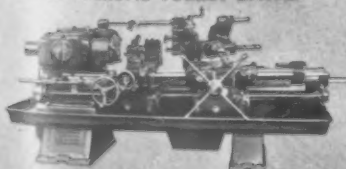


Close view of tooling on a Jones & Lamson 12" Fay Automatic Lathe tooled to face, groove and cam turn automobile pistons.

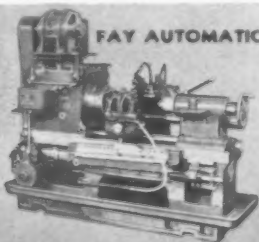


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**SADDLE TYPE  
UNIVERSAL TURRET LATHE**



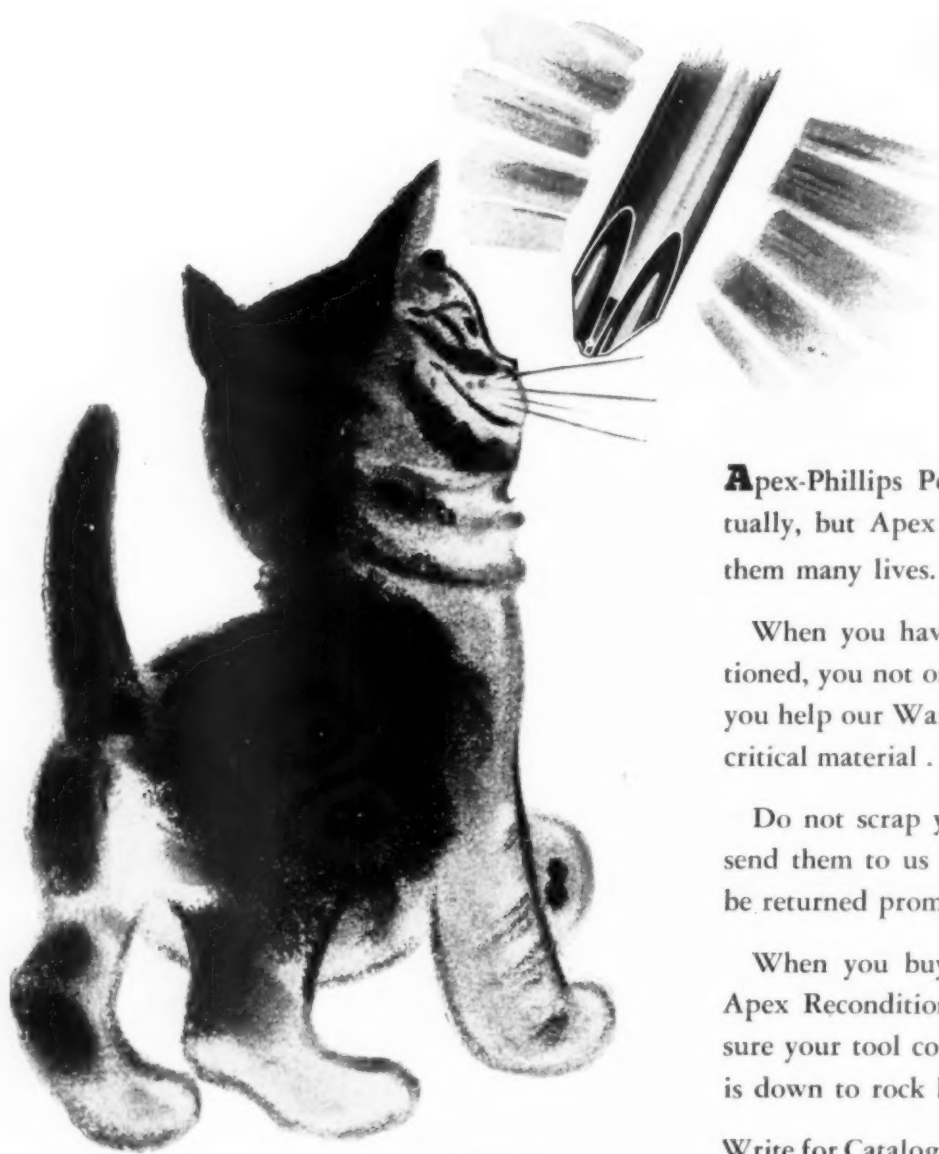
**FAY AUTOMATIC LATHES**



**AUTOMATIC OPENING  
DIE HEADS**



# Here's a screw driver bit that has **more lives** than a cat



**A**pex-Phillips Power Bits do wear out eventually, but Apex Reconditioning Service gives them many lives.

When you have Apex-Phillips Bits reconditioned, you not only save important money, but you help our War Effort by conserving a vitally critical material . . . Tool Steel.

Do not scrap your worn out Phillips Bits—send them to us for reconditioning. They will be returned promptly, just as good as new bits.

When you buy Apex-Phillips Bits and use Apex Reconditioning Service you can then be sure your tool cost per thousand screws driven is down to rock bottom.

Write for Catalog # 15 for complete information.

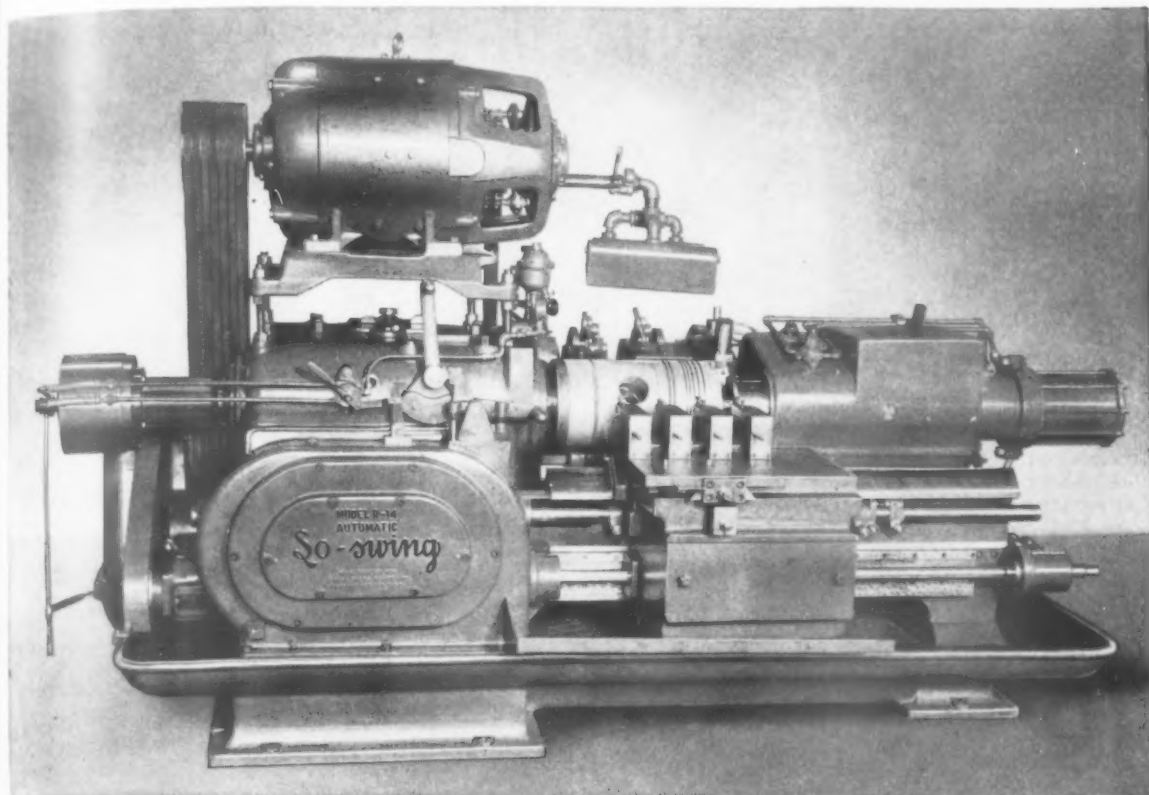
# THE APEX

**MACHINE & TOOL COMPANY, DAYTON, OHIO**

*Manufacturers of Power Bits for Phillips, Slotted Head and Clutch Head  
Screws, and Hand Tools for Phillips and Clutch Head Screws*

# MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK



Front view of machine with belt cover removed to show V-belt drive.

Close-up view showing tooling.

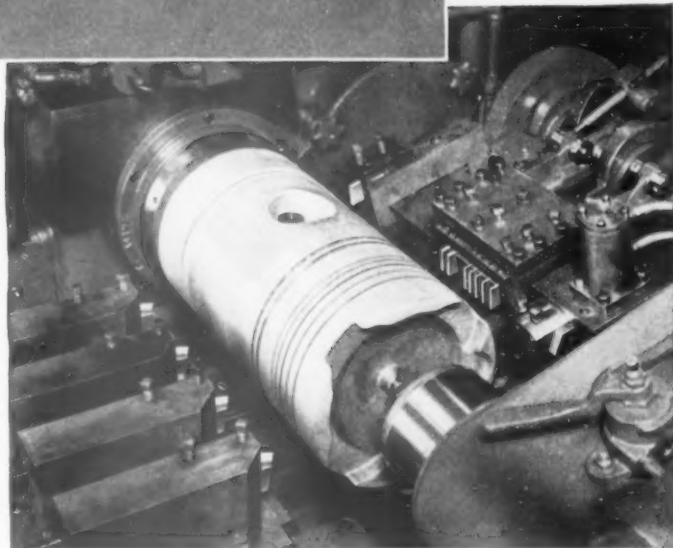
## Lo-swing MODEL R-14 LATHE EQUIPPED FOR TURNING LARGE SIZE DIESEL MOTOR PISTONS

**Problem:** To automatically turn, groove and face special alloy pistons having a maximum diameter of 10.5".

**Solution:** The Model R-14 Lo-swing was selected for this job due to its rigidity and "Simplified Change-over Mechanism" which permits changing over from one size piston to another in a few minutes by simply making a few adjustments in gear segments which control cross slide movements.

The work is centered on the driven end with an adapter plate machined to fit the bore of the open end of the piston which has been previously machined. This adapter is fitted with a hardened steel driving plate which contacts a lug cast on the inside piston wall, assuring a positive drive. The piston is supported on the tailstock end with a standard 60° revolving type center.

The turning operation consists of machining the outside diameters with four tools mounted on a single cross slide 17" wide. The grooving and facing tools are clamped on two independently operated Back



Squaring Attachments, the movements of which are synchronized with the front slide.

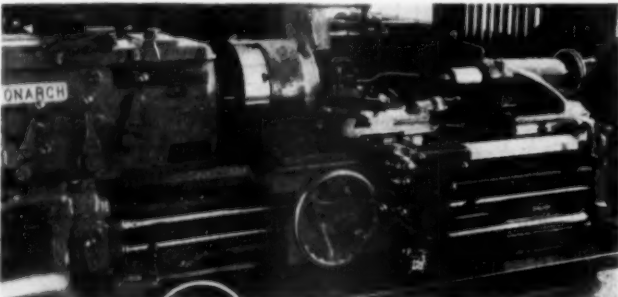
The end facing tool is mounted in a special relieving type tool block (see close-up view) which automatically relieves the tool on the return stroke, preventing any scoring or marking of the finished face. The relief mechanism is controlled with a small cam mounted on back attachment cam shaft and may be set to obtain tool relief at any time during the operating cycle.

Sintered carbide tools are used on this job and a high grade finish is obtained on the ring grooves.

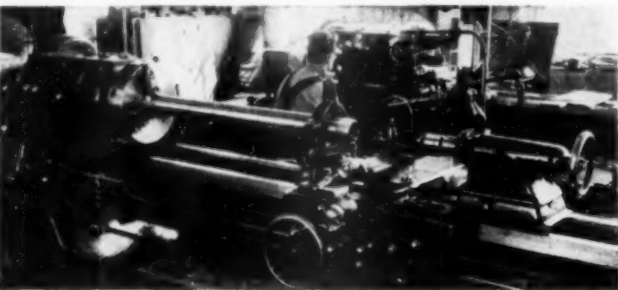




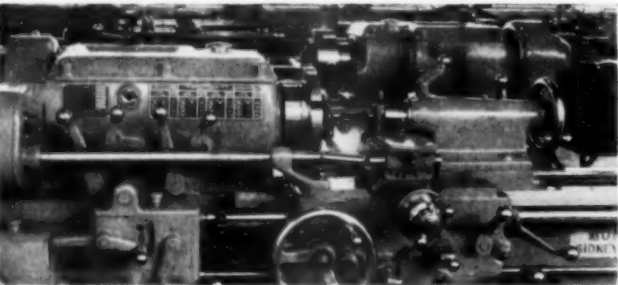
Earnest attitude of this highly-rated operator of York County is indicative of spirit prevailing throughout the area. Coarse Acme thread being chased on a Monarch lathe without a steady rest. Work is rough cut with a square nosed tool and finished with forming tool.



In this plant, flywheel rings for Diesel engines are produced from 1035 cast steel tubes 18" in diameter and 20" long. With one chucking, they are bored, turned and cut off on a Monarch lathe. No chatter even at 20" from the chuck.

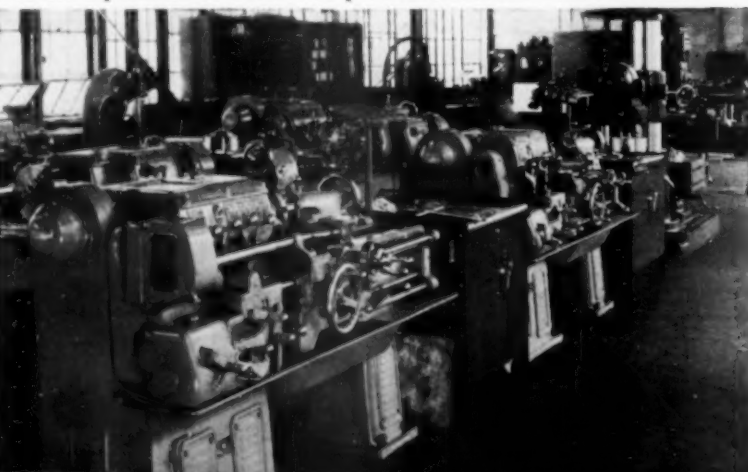


Breech end of trench mortar tube being finished at another plant in the York area. In background, another Monarch set up for chucking operation on a housing for hydraulic press.



The Monarch relieving attachment set up for backing-off a tap.

Lathe department of another shop which includes 7 Monarch lathes.



# TEAMWORK

## does the job at York, Pa.

York County has shown the way. Through the fine co-operation of plants in this area, guns, mounts, trench mortars, and other Victory essentials are pouring out of this arsenal, on time. Teamwork has done it.

We at Monarch are proud of York's record, too. Proud because Monarch lathes are used so extensively throughout the plants in the area. In 26 shops, you'll find Monarchs on the job, day and night, saving time, turning out superior work with the finest precision. York users like Monarchs because of their complete dependability under today's severe service. Operators like them because they're easy to use, deliver a bigger day's work with less fatigue.

As in York County, Monarch lathes are at work throughout the country, helping build the implements of Victory. Although we are delivering twice as many Monarchs in 1942 as in 1941, they're as trustworthy, as efficient, as accurate as always.

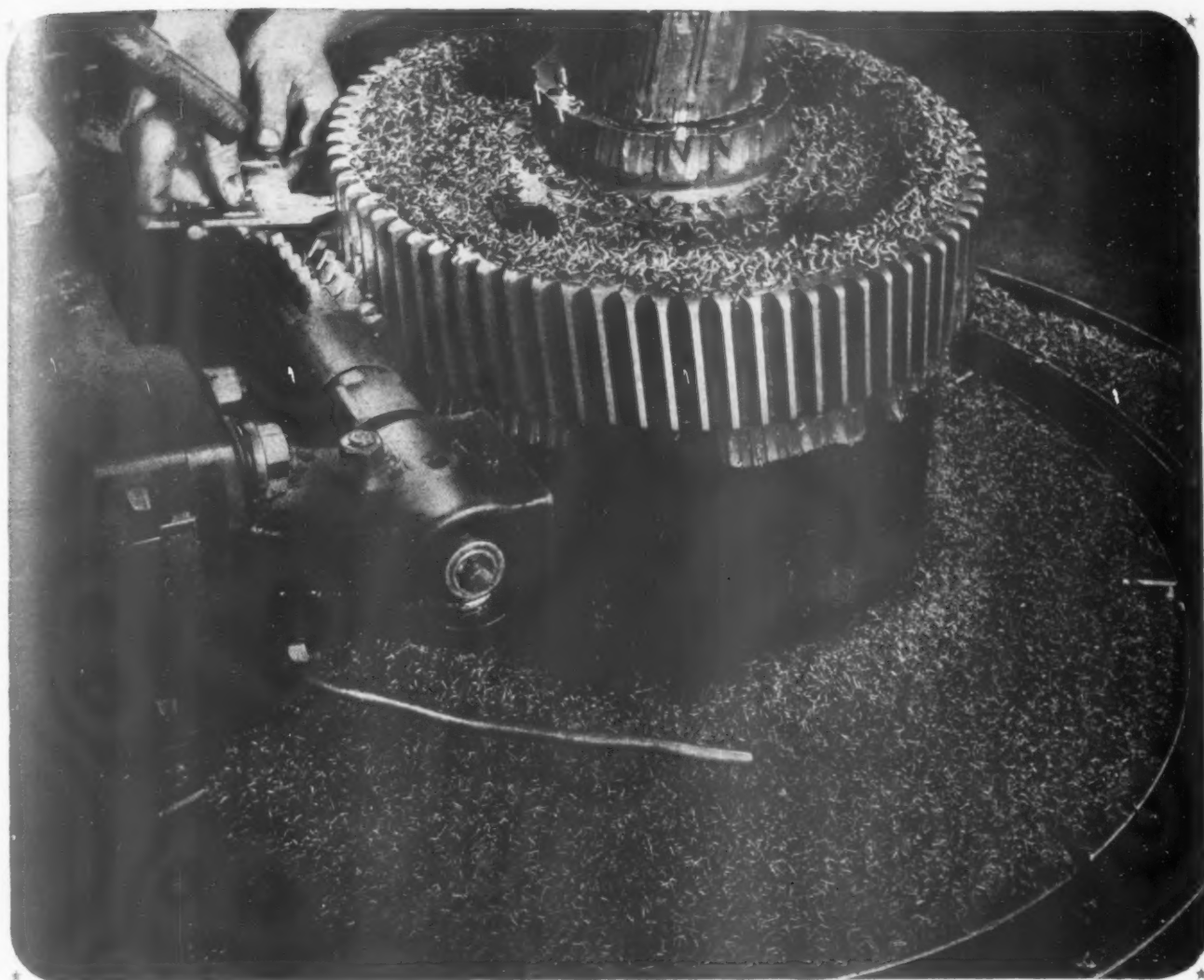
THE MONARCH MACHINE TOOL COMPANY • SIDNEY, OHIO

**MONARCH**  **LATHES**

COVER THE TURNING FIELD

Student in York Vocational School turning large diameter shaft, on Monarch lathe. Note tailstock overhangs bed, yet heavy cut is being taken. Because students move from training on Monarchs to production on Monarchs, they do faster, better work and help York set its splendid record of accomplishment.





## ***KEEP 'EM CUTTING . . AND SAVE THE PIECES***

**I**N this war, machine tools on the average are cutting away steel at a rate more than 12 times faster than in 1918. That's production—keep them cutting!

Keep them cutting *faster* by selecting tool steels more closely suited to the job. Case after case in our files show increases in feeds, speeds, or pieces per grind—increases, often, of 50% and more—when the *right* tool steel went to work.

Keep them cutting *constantly* by knowing the best alternate tool steel for each job. Know it, and know its performance, as insurance against a time when your first-choice steel may be short in supply.

*And save the pieces!* Every particle of steel, especially High Speed Steel, is important, and much critical alloy material can be saved for re-use if proper methods of reclamation and classification are employed. Let

our Service Staff help with your problems of tool steel selection, treatment, use and salvage.



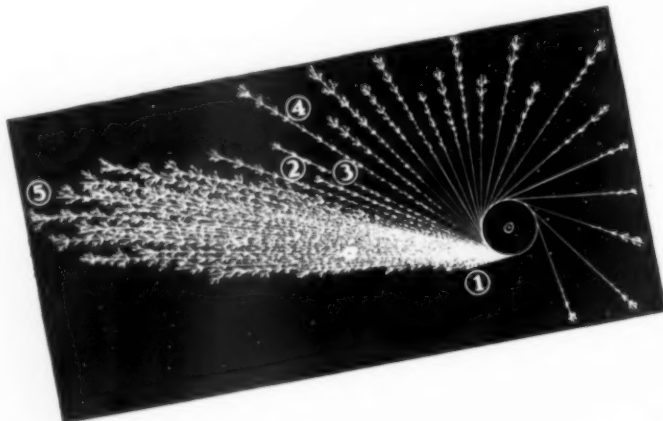
***Allegheny Ludlum***  
**STEEL CORPORATION**  
GENERAL OFFICES: PITTSBURGH, PENNSYLVANIA

## HERE'S A WAY TO SEPARATE *Your* TOOL STEEL SCRAP!



With a serious shortage of steel scrap actually curtailing armament production—you do not have to be told *why* every pound must be put to work, *now!*

In your tool room, machine shop and throughout the plant there are worn or obsolete dies, tools, jigs and fixtures that *should* be helping to make more fighting equipment for our soldiers. Dig them out. They are the *start* of more war weapons. Then separate your tool



### USE SPARK TESTING

- to separate miscellaneous tool steel scrap, your broken tools, worn dies, etc.
- to classify tool steel that has lost its identity in stock.

IN TOOL ROOMS, many hours and precious pounds of metal are saved when tools are always made from the right tool steels. Let your tool makers use the Carpenter Spark Testing Guide to help them classify tool steel that has lost its identity.

THE CARPENTER STEEL COMPANY  
122 Bern St., Reading, Pa.

18

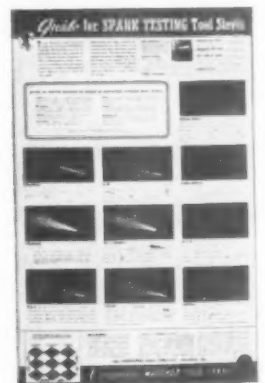
steel scrap. It is worth more to you, and to your country, when it is properly sorted.

To help you separate your tool steel scrap for salvage, our Testing Department has developed the *Spark Testing Guide* offered below. This 21" x 30" wall chart will be helpful to your men in learning more about *Spark Testing* to quickly classify tool steel scrap.

### SPARK TEST FOR No. 11 SPECIAL Straight Carbon Tool Steel

*This spark is one of the most spectacular to observe. The stream is full and brilliant. It is characterized by a dense stream (1) adjacent to the wheel. Carrier lines (2) are relatively long, continuous, brilliant, almost white. Stream is composed of sprigs (3), preliminary bursts (4) and main bursts (5)—none of them suppressed. There is a tendency for the spark to be carried around the periphery of the wheel.*

A note on your company letterhead will bring you this new wall chart. From it your men can learn the spark patterns caused by the major elements in tool steel. Instructions are also given for Spark Testing procedure; wheel speeds, effects of wheel grain size, dressing the wheel and pressure required. Write today for your *Guide for Spark Testing Tool Steels*.



# Carpenter

## MATCHED TOOL STEELS

THE TOOL ENGINEER



**OUR  
SALESMEN  
YESTERDAY ...**

**.... YOUR FIELD  
SERVICE ENGINEERS  
TODAY!**

1. Yesterday we had 20 salesmen, today they are your field service engineers — for the duration. And these service engineers can really help you. If you have any kind of problem involving precision boring and grinding you'll find their common sense and practical experience invaluable. To get a Heald Service Engineer, just call the nearest Heald branch office. Then take him out in the shop, on the job. Solving finishing problems day after day will probably produce a quick answer to yours. Or perhaps he'll suggest some improvement, some better way to "up" production, improve finish and accuracy. If it's a brand new finishing operation he can recommend the most efficient equipment for the job, he'll get you production estimates and costs. But regardless of your kind of problem, as long as it's precision finishing you'll find your Heald Service Engineers a convenient source of expert on-the-spot consultation. And remember, all you need to get this service is the nearest telephone.

ARMY  NAVY

**Heald** 3 POINT SERVICE  
*Keeps Production Rolling*

1.

Field Engineering Service

2.

Factory Engineering Service

3.

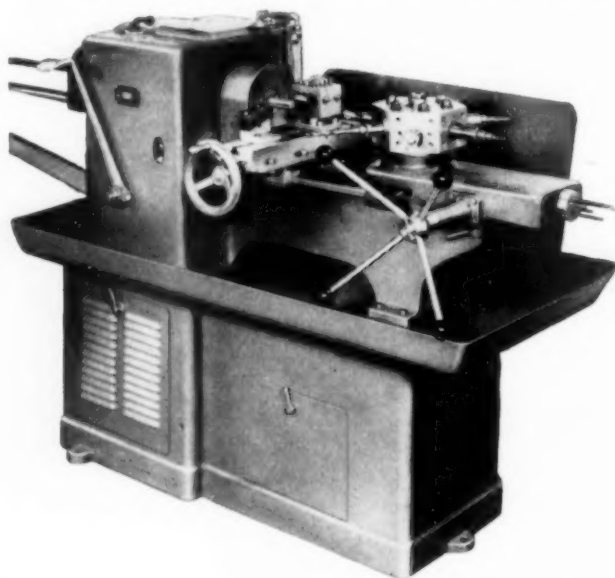
Demonstration and  
Maintenance Service

**THE HEALD MACHINE CO. WORCESTER, MASS., U. S. A.**  
**MANUFACTURERS OF PRECISION BORING AND PRECISION GRINDING MACHINES**



The Oster No. 601 SIMPLIFIED Turret Lathe meets today's urgent needs for a low cost, motor driven bar and chucking machine for a wide range of small diameter jobs not requiring complicated, costly equipment or highly skilled set-up men and operators.

For complete details, fill out form below and mail. A copy of illustrated Catalog No. 27-A will be sent to you promptly.



**THE OSTER MFG. CO. • 2063 East 61st St., Cleveland, Ohio**

Rush, by return mail ..... copies of Catalog No. 27-A which contains full description and detailed illustrations of No. 601 Turret Lathe.

NAME .....

ADDRESS .....

CITY..... STATE.....

# SIX

## IMPORTANT ADVANTAGES GAINED WITH

# OSTER

## No. 601 SIMPLIFIED TURRET LATHE

**1** Release your more complicated, costlier machines for other work. The Oster No. 601 Turret Lathe has proved its efficiency on a wide variety of bar and chucking operations in the small diameter range up to 1½-inch.

**2** Release your highly skilled set-up men and operators for work demanding their expert services. The Oster No. 601 Turret Lathe has hand feed to cross slide and manually operated, six station turret.

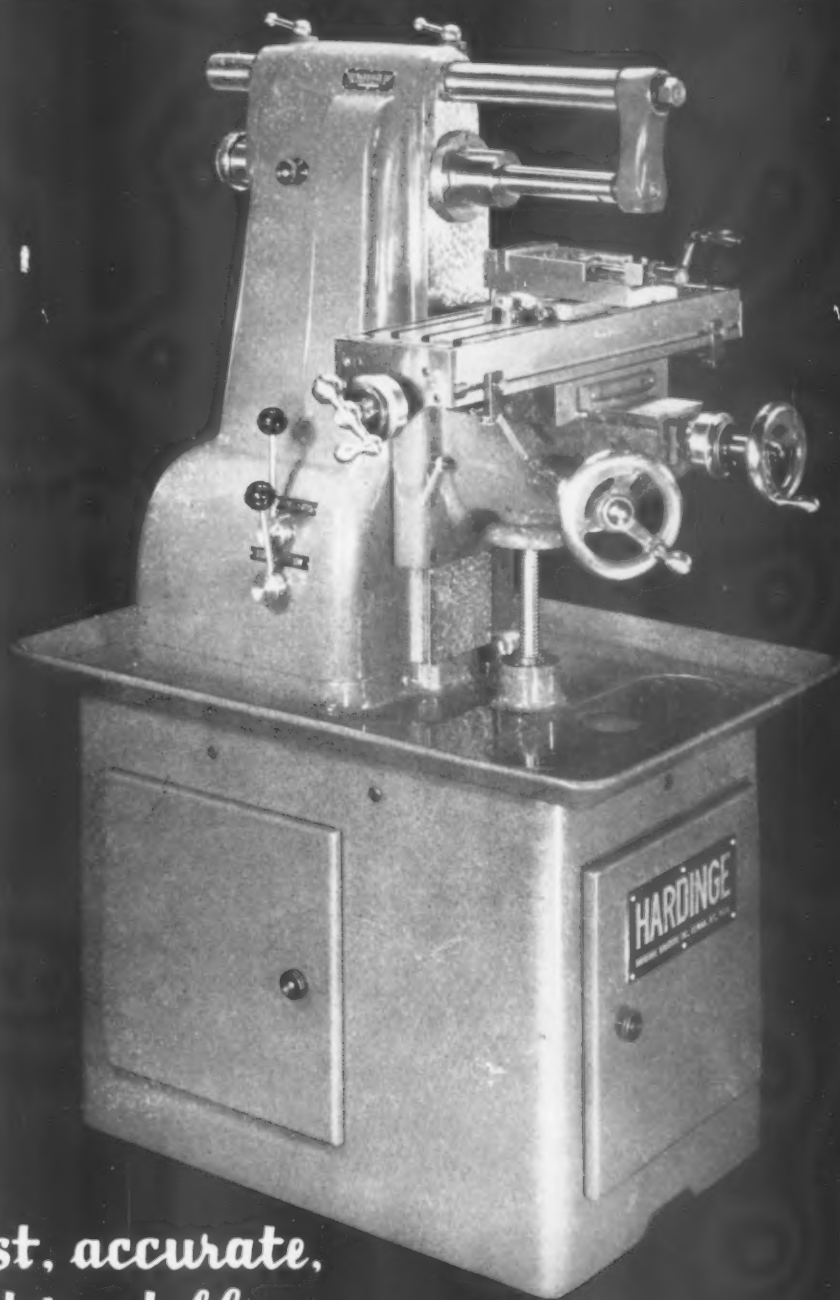
**3** Speed up training of new operators. The simplified design and operation of the Oster No. 601 Turret Lathe saves months in training new men to high standards of efficiency.

**4** Maintain flexibility for quick change-overs from job to job. For example, a battery of six Oster No. 601 Turret Lathes permits using all six machines on identical work, or, at any time, releasing one or more of the six machines for different work.

**5** Obtain quicker deliveries of Oster No. 601 Turret Lathes and eliminate costly delays waiting for shipments of more complicated machines which you may need now but can't get for months to come.

**6** Save money on initial investment in machinery. The Oster No. 601 Turret Lathe equipped with optional *worm drive* or *direct drive* and *six station turret* costs less than \$2000 without tools and fixtures.

THE TOOL ENGINEER



*Fast, accurate,  
dependable . . .*

Fast, accurate, dependable . . . these three words are constantly mentioned when users state their experience with HARDINGE High Speed Precision Milling Machines.

Ruggedness is combined with extreme accuracy for ease of operation . . . high spindle speeds insure better finish as they afford proper cutting conditions.

Ask for our latest bulletin giving complete details.

*Performance has established leadership for HARDINGE"*

**SPECIFICATIONS:**

Table: 25" x 6-1/2"

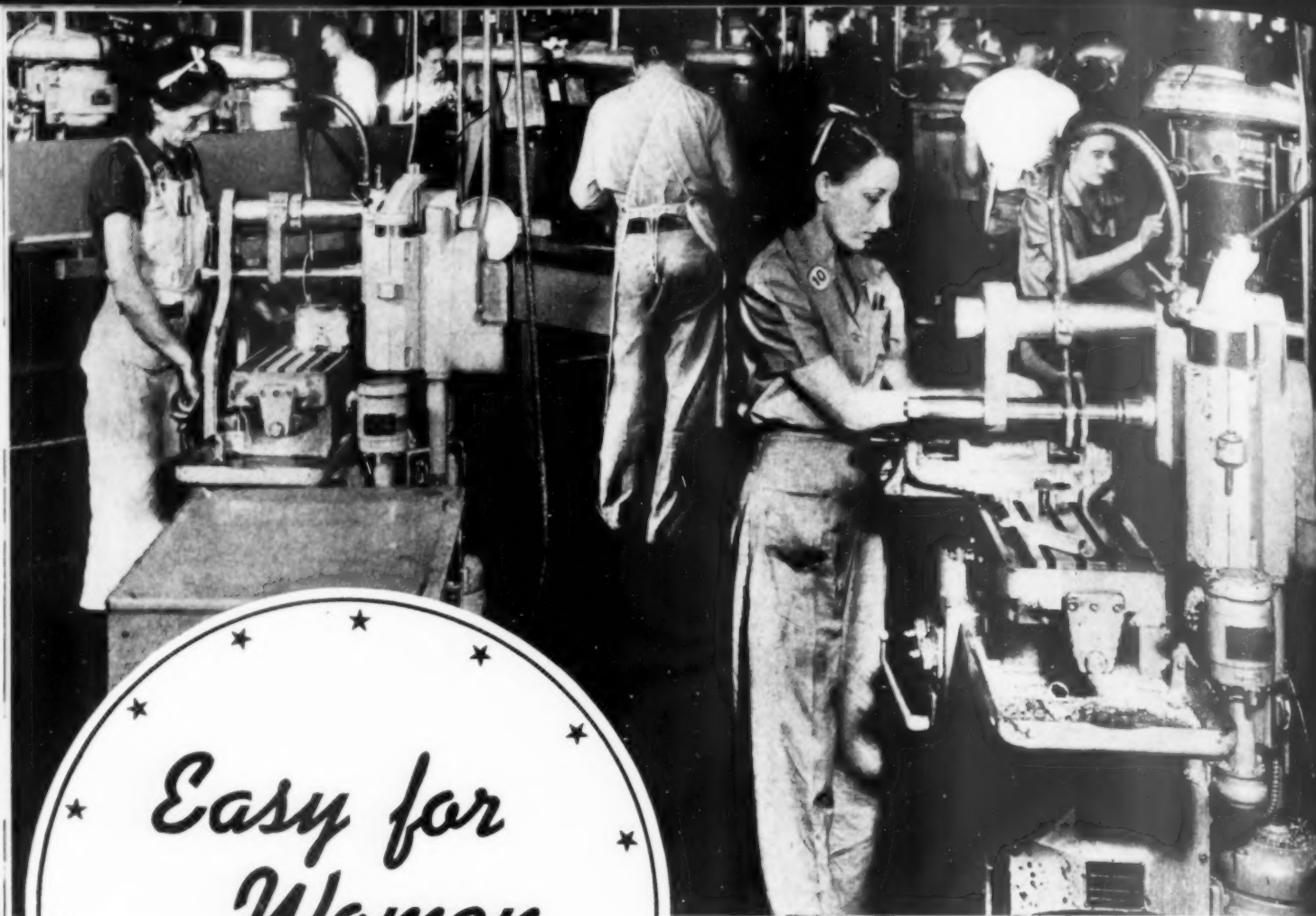
8 Speeds: 110 to 1850 R. P. M.

Cutter and Index Head have 1" Collet Capacity

**HARDINGE**

HARDINGE BROTHERS INC., ELMIRA, N.Y., U.S.A.





Courtesy Vultee Aircraft, Inc.

# Easy for Women

TO PRODUCE EFFICIENTLY  
ON KENT-OWENS MACHINES

## THERE'S A KENT-OWENS REPRESENTATIVE NEAR YOU

BOSTON General Machinery Corp.	MOLINE John J. Normoyle Co.
BUFFALO Don W. Patterson	MONTREAL F. F. Barber Machinery Co.
CHICAGO Neff, Kohlbusch & Bissell	NEW ORLEANS Oliver H. Van Horn Co., Inc.
DALLAS Hamilton-Huster Machinery Co.	NEW YORK Wilson Brown Company
DAYTON Gosiger Machinery Co.	PHILADELPHIA Calco Machinery Company
DETROIT A. C. Haberkorn Machinery Co.	PITTSBURGH Barney Machinery Co.
GRAND RAPIDS Joseph Monahan	ROCHESTER F. W. Schiefer Machinery Company
HOUSTON Oliver H. Van Horn Co., Inc.	SAN FRANCISCO C. F. Bulotti Machinery Co.
INDIANAPOLIS Oatis-Booth Machinery Co.	SEATTLE Star Machinery Company
KANSAS CITY Eichman Machinery Co.	ST. LOUIS Blackman & Nuetzel Machinery Company
LOS ANGELES Eccles & Davies Machinery Company	SYRACUSE J. F. Owens Machinery Co.
Harron, Richard, & McCone	TORONTO F. F. Barber Machinery Co.
MILWAUKEE Neff, Kohlbusch & Bissell	WALKERVILLE F. F. Barber Machinery Co.

● At the Vultee Aircraft plant, women are proving adept operators of Kent-Owens Milling Machines.

Thus, aircraft builders are pointing the way to one solution for the critical shortage of skilled help in war plants.

Experienced shop men have long demanded Kent-Owens Milling Machines for their outstanding simplicity, ruggedness, dependability... features that appeal to *practical* men. These factors become increasingly important as more and more green hands are called upon to man America's war production machines.

Kent-Owens Machine Company, Toledo, Ohio.

Call on **KENT-OWENS**  
for Milling Machines



Wright Aeronautical Photograph

## SUPERCHARGER GEARS

for the CYCLONE 9 Engine  
in the Grumman MARTLET 1  
Fighter are cut on...

## BARBER-COLMAN HOBGING MACHINES



### PART AND PRODUCTION DATA

Part — Supercharger Intermediate Gear for Wright Cyclone 9 Engine.

Material — AMS 6250 Steel, a tough material.

Dimensions — 5.969" O.D.,  $\frac{3}{4}$ " face, 57 teeth, 10/12 pitch.

Machine Set-up — Hob speed, 91 r.p.m.; feed, .043" per rev. of work.

Production — 27 min. per piece, floor-to-floor; one piece per load. One finishing cut.

Hob —  $2\frac{1}{4}$ " x  $2\frac{1}{2}$ " x  $1\frac{1}{4}$ " straight hole, ground, single thread; 3 to 4 settings per sharpening and 12 pieces per setting.

**B**ecause every precaution must be taken to insure accuracy in engines for the highly efficient fighting aircraft of modern warfare, the blank for this supercharger gear is held in the hobbing machine on a special work arbor which accurately locates the piece from its finished ground hubs. Before cutting, the blank is trued to an eccentricity of less than .0003". Also, the special arbor supports the blank rigidly on the sides close to the teeth, to avoid any chance of vibration spoiling the fine finish and accuracy required. A Barber-Colman Type "A" Hobbing Machine is used because its rugged construction, combined with the special work-holding device, insures consistent production of high quality work.

This is one of many applications where Barber-Colman Hobbing Machines are doing their part in producing important parts for vital weapons. All of Barber-Colman's machine production is directed into the war effort.

## BARBER-COLMAN COMPANY

General Offices and Plant 213 Loomis Street, Rockford, Illinois, U. S. A.



# A New Steel *Perfected*-

## Just when You Need it Most

# INGERSOLL D-B-L\* HACK SAW STEEL



*Produced under exclusive  
license arrangement with  
Allegheny-Ludlum Steel  
Corporation*

### Other Special INGERSOLL Sheet Steels include:

Alloy Steels  
Armor Plate  
Clutch Plate Steels  
Tillage Steels  
Soft Center Steels  
Shovel Steels  
Knife Steels  
TEM-CROSS Steel  
Ingaclad (Stainless-  
Clad Steel)  
Stainless Steels and  
Saw Steels, including  
"18-4-1" and Molyb-  
denum and D-B-L  
Hack Saw Steels.

*Faced with the biggest job it has ever known, American  
Industry welcomes the timely development of Ingersoll D-B-L.*

With 18-4-1 restricted by the shortage of vital alloys, the problem of supplying hack saw blades that would meet every shop need became a serious one.

Ingersoll D-B-L is so high in impact resistance, provides so tough a cutting edge, and is relatively so free from decarburization, that when these advantages are added to its lower cost, there is every reason to believe Ingersoll D-B-L has found a permanent place in the modern shop.

Here is one substitute developed by necessity which may well become the prime metal for future hack saw blade use.

*Specify Ingersoll D-B-L Steel on orders for Hack Saw Blades.*

**INGERSOLL STEEL & DISC DIVISION  
BORG-WARNER CORPORATION  
NEW CASTLE, INDIANA**

Plants: New Castle, Ind.; Chicago, Ill.; Kalamazoo, Mich.

# INGERSOLL

**SPECIAL STEELS for SPECIAL USES**





# HOW TO GET THE MOST OUT OF YOUR LATHES

No. 2 in a series of suggestions made by the South Bend Lathe Works in the interest of more efficient war production.

## Keep Them Well Oiled

*For lack of oil the bearing was lost;  
For lack of a bearing the tank was lost;  
For lack of a tank the battle was lost;  
All for the lack of a film of oil.*

Cleverly paraphrasing the ancient rhyme about the horseshoe nail, a young army officer is said to have used the above verse to emphasize the importance of lubrication in mechanized warfare. And this thought is just as applicable to the battle of production in American shops as it is to the tank battles in distant lands.

• The proper lubrication of lathes and other machine tools will contribute much to our total war effort by preventing unnecessary interruption of production. It will also save scarce strategic materials and highly skilled technical labor by reducing to a minimum the demand for replacement bearings, parts, and machines.

South Bend Lathes, like other fine machine tools, have large oil reservoirs, felt wicks, and oil retainers to guard against lack of oil due to temporary neglect or oversight. But for best results the lathe should be oiled at regular intervals. Even a camel must have an occasional drink.

### Make Oiling a Habit

All oil holes and oil cups on the lathe should be filled at least once a day — oftener when the lathe operates day and night — or when top speeds and feeds are employed. The best method is to fill each oil hole in a regular sequence so that oiling becomes a habit and no oil holes are overlooked. When the lathe is in service on two or more shifts, oiling the lathe should be the first daily task of each operator.

To help the inexperienced operator find the oil holes, a circle of brightly colored paint may be applied around each oil cup. Different colors



All bearings should be oiled at regular intervals

of paint can be used to indicate different grades of oil.

### Use Correct Grade of Oil

When the correct grade of oil is used in a well designed bearing there is little or no metal to metal contact and practically no wear. However, when the wrong grade of oil is used, or if the oiling is neglected, the oil film will break down and the fine finish of the bearing surface may be damaged in a short time.

The V-ways of the lathe bed, and the dovetails should be oiled as often as is necessary to maintain a good oil film. Touching the bed way with the tip of the finger will indicate whether or not it is coated with a film of oil.

Motors should be lubricated according to the motor manufacturer's instructions which are usually at-

tached to the motor. Care should be taken to avoid getting oil on rubber V-belts or flat leather belts, as it is injurious to both.

### Clean Lathe After Oiling

After the oiling has been completed, the excess of oil should be wiped off with a clean cloth. The lathe should be kept clean. Dirt, chips, or rust should not be allowed to collect.

### Write for Bulletin No. H2

Bulletin No. H2 giving more complete information on oiling the lathe will be supplied on request. Oiling charts for South Bend Lathes, and reprints of this and other advertisements in this series can also be supplied. State quantity wanted, also serial numbers of lathes for which oiling charts are needed.



## SOUTH BEND LATHE WORKS

Dept. 927

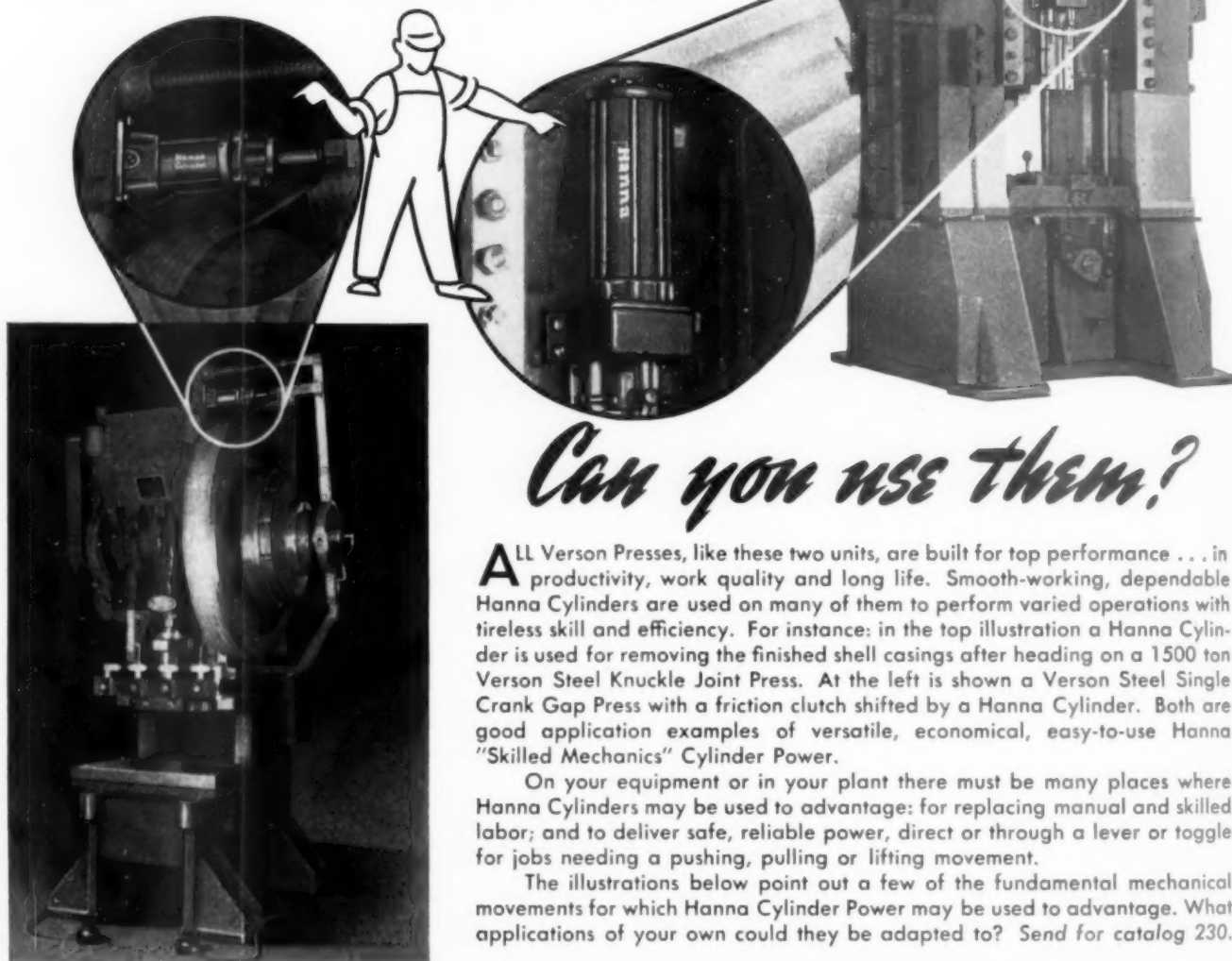
• South Bend, Ind., U. S. A. •

Lathe Builders for 35 Years

# Hanna Cylinders

Air and Hydraulic

*These **SKILLED MECHANICS**  
are helping presses  
operate at top efficiency*

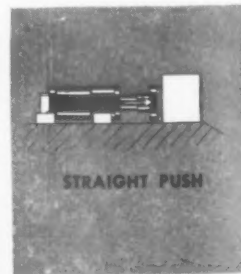
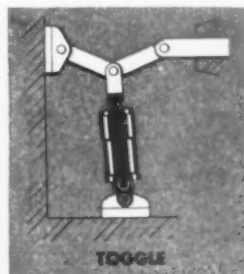
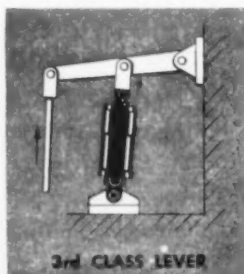
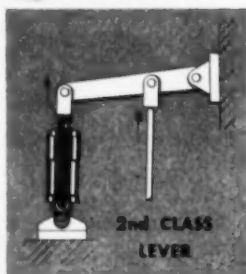
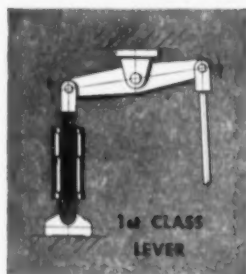


*Can you use them?*

**A**LL Verson Presses, like these two units, are built for top performance . . . in productivity, work quality and long life. Smooth-working, dependable Hanna Cylinders are used on many of them to perform varied operations with tireless skill and efficiency. For instance: in the top illustration a Hanna Cylinder is used for removing the finished shell casings after heading on a 1500 ton Verson Steel Knuckle Joint Press. At the left is shown a Verson Steel Single Crank Gap Press with a friction clutch shifted by a Hanna Cylinder. Both are good application examples of versatile, economical, easy-to-use Hanna "Skilled Mechanics" Cylinder Power.

On your equipment or in your plant there must be many places where Hanna Cylinders may be used to advantage: for replacing manual and skilled labor; and to deliver safe, reliable power, direct or through a lever or toggle for jobs needing a pushing, pulling or lifting movement.

The illustrations below point out a few of the fundamental mechanical movements for which Hanna Cylinder Power may be used to advantage. What applications of your own could they be adapted to? Send for catalog 230.



**HANNA ENGINEERING WORKS**  
1765 ELSTON AVENUE • CHICAGO, ILLINOIS

Air and Hydraulic  
RIVETERS

Air and Hydraulic  
CYLINDERS

Air HOISTS

# HOW TO SEE ERRORS IN DIMENSIONS.

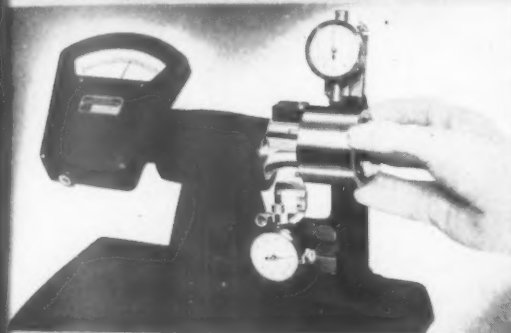
To see errors in dimensions as small as only .0002" or even as large as .002" by depending upon one's sense of touch alone is leaving a great deal to chance. Sense of touch cannot be magnified but vision can be magnified so that we can see errors quickly and accurately. Visual gages also make it possible to inspect several dimensions simultaneously.



.001" is easy to see on this gage (Model 165). Sensitive plugs are interchangeable for different sized holes. Diameters as small as .1875" can be inspected by it.



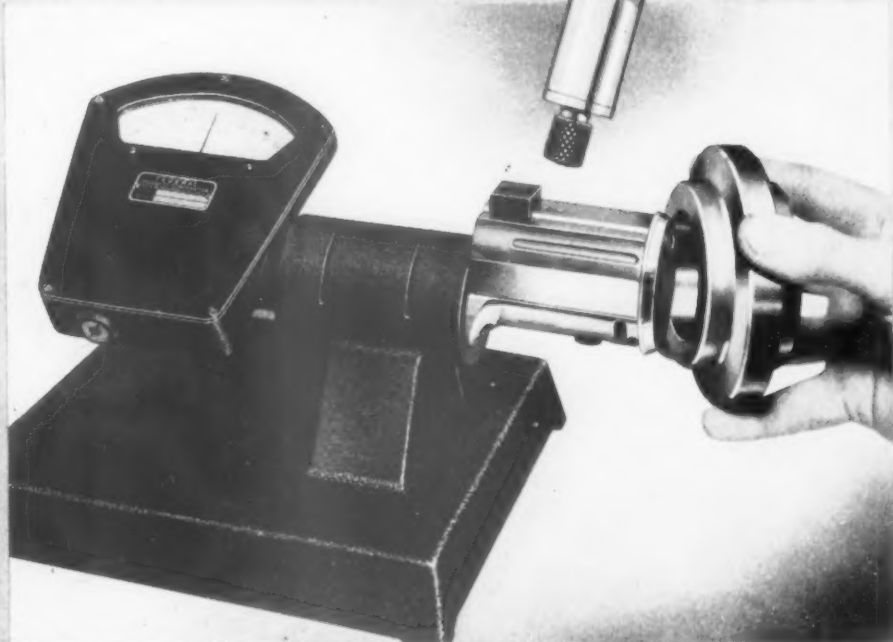
"Feeling" a tolerance of even .002" is not as quickly determined as by a glance at a needle movement of approximately  $\frac{3}{16}$ ".



Visual or Dial Indicator Type Gages enable you to inspect several dimensions simultaneously and to determine the relationship of dimensions with each other. Here concentricity of the outside diameter is checked with the inside diameter. The lower indicator checks the squareness of the end with the axis of the inside diameter and the latter is checked for its own accuracy of diameter, roundness and taper. Try to do this with a "fixed" gage.

These are typical of many other possibilities well worth your investigation. Practically any detail can be inspected for accuracy of dimension — Inside, Outside, Offset, Alignment or Position and Profile. Ask for further information.

FEDERAL PRODUCTS CORPORATION  
PROVIDENCE RHODE ISLAND



Here .00005" is magnified to look like  $\frac{3}{32}$ ". Considerable training is necessary to acquire skill for feeling such precision. The weight of the workpiece doesn't influence the reading as the contact is on the underside of the interchangeable plug. The gage is Model No. 1202 B-6.

## FEDERAL

PRECISION MEASURING INSTRUMENTS

Chicago • Cleveland • Detroit • Hartford • Los Angeles • Milwaukee • Montreal • Muncie  
New York • Philadelphia • Pittsburgh • Rochester • San Francisco • St. Louis • Toledo • Toronto • Windsor





**PATENT  
APPLIED FOR**

Designed by  
Francis E.  
Brady, Jr.,  
Hydraulic  
Engineer.  
Consultant  
to many  
machine  
tool manu-  
facturers.



# *Announcing the New*

## MODEL 7500

# COOLANT PUMPS

The most adaptable pump of all . . . MODEL 7500 by BRADY-PENROD, INC.! This pump may be made an integral part of any grinder, lathe, cutting or drilling machine or can be easily moved from job to job as needed. A plate adapter is available to fit any tank or base opening. This model is a motor-driven open-impeller centrifugal type, submergible, with an outside discharge. Internal piping is eliminated; external piping reduced to a minimum. This simplification saves engineering and assembly labor.

### THREE DEPTHS SUITABLE FOR ALL MACHINES

MODEL 7500 is available with 3 different depths from flange -  $4\frac{7}{8}$ ", 9", and 15".

Motor capacity -  $\frac{1}{8}$  H.P. to  $1\frac{1}{2}$  H.P.

Controlled flow - from 4 g.p.m. to 100 g.p.m. with any standard coolant fluid. Suitable for use with abrasives. Special depths available.

Long used as standard equipment by machine tool manufacturers, BRADY-PENROD Pumps (6 other models) are proving their reliability and high hydraulic efficiency in hundreds of locations today. Write or wire for details.

# *Brady-Penrod*

INCORPORATED

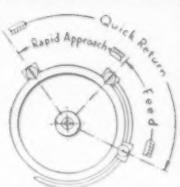
1216 W. SECOND STREET  
MUNCIE, INDIANA, U. S. A.

# Engineered Production

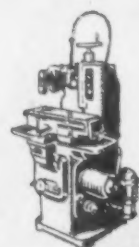


## Quick Set-Up

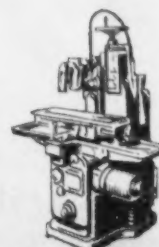
Sundstrand Automatic Lathes run on cycles of rapid approach, feed, quick return of 250" a minute. These are set up quickly and changed over easily by adjusting dogs on a graduated disc, as indicated at right. No cycle-control cams required.



**Turning Time Reduced  
From 17 to 7 minutes**

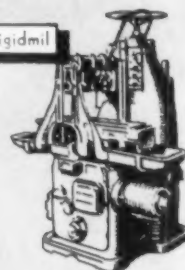


No. 00 Rigidmil



No. 0 Rigidmil

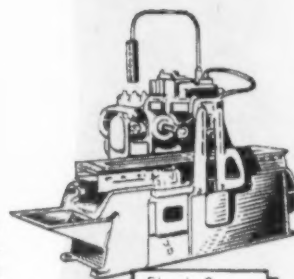
No. 1 Rigidmil



*For Quick  
Facts*



Get this booklet. See illustrated details of design and construction, cycle diagrams, specifications and other data. Write today. Ask for Bulletin 805.



Fluid-Screw  
Rigidmil

## On Aircraft Engine Parts

**142% Increase...** Engineered Production and a Sundstrand Automatic Lathe increased output for turning operations on propeller shaft sleeves 142% over former method. This airplane engine part, run in lots of approximately 200, is made in nine different sizes each requiring a different set-up. The Sundstrand Automatic Lathe illustrated handles all nine sizes... is readily changed from one size, or job, to another. Quick set-up of cycle is outlined above. Establishing most efficient spindle speeds, feeds, and holding accurate sizes is equally simple. Additional Sundstrand Automatic Lathes in same plant show similar production increases on a wide variety of airplane engine parts turned in both small and large quantities.

**Why is this Possible?**... Because the Sundstrand Automatic Lathe cycle control enables change-over from one job to another in 20 to 30 minutes. Thus the advantages of a fast automatic operating cycle, high rapid

traverse rate of 250" per minute, and multiple tooling, all of which are necessary for maximum stock removal and high production, are available for short run work.

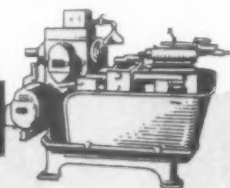
**Close Limits at Less Effort...** With a Sundstrand Lathe the operator only has to change work pieces and start the automatic cycle. The lathe does the heavy work and maintains uniformly close limits. Usually the operator can run two or more machines.

**At Your Service...** Airplanes, arms, ammunition, engines, ships, tanks, trucks, tractors, transport vehicles — no matter what war equipment you make, Sundstrand Automatic Lathes give you important proved and exclusive advantages on any metal-turning in their field. Our Engineered Production Department is at your service for making most effective use of these advantages. Simply send us accurate data on your turning requirements.

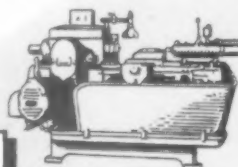
## Sundstrand Machine Tool Co.

2532 Eleventh Street, Rockford, Illinois, U. S. A.

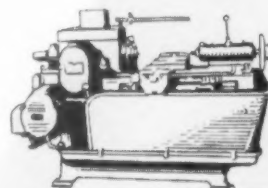
Model 8  
Automatic  
Stub Lathe



Model 10  
Automatic  
Stub Lathe



Model 12  
Automatic  
Stub Lathe



In their respective fields, Sundstrand machine tools are unexcelled for high production, accuracy, and lasting value. Write for complete details.



## RIGIDMILS · STUB LATHES

Hydraulic Operating Equipment — Drilling and Centering Machines



## SUBMARINE PARTS PRODUCTION SPEEDED... THANKS TO *Barnes "Know How!"*

**C**utting fins from a large manganese bronze casting, a well-known Eastern foundry was getting only 30 to 90 minutes from a  $\frac{3}{4}$ " — 10 tooth band saw blade.

Poor blade life in this case meant a great deal more than high tool cost. It adversely affected production of a vital submarine part — since each time the blade failed in the cut, an involved set-up operation had to be done over again.

Finally a Barnes man was called in to look at the job. In a few minutes he had diagnosed the trouble; in a half hour it was corrected. Blades at this foundry are now delivering six hours or more of work.

Making blades *work* is as important to Barnes as making them *well*. Barnes blades are recognized in industry for their uniformity.

### CALL YOUR DISTRIBUTOR

Today your surest, quickest, most complete service for practically any staple industrial product is to be had from your Mill Supplies Distributor. Make a habit of calling him *first* when you need anything. And don't forget to ask for Barnes Blades with your next order.

**W. O. BARNES CO. INC.**  
DETROIT MICHIGAN

*A Barnes Blade is Better*





OFFICIAL U. S. NAVY PHOTOGRAPH



# *Jarvis* POWER TOOLS

## READY FOR ACTION

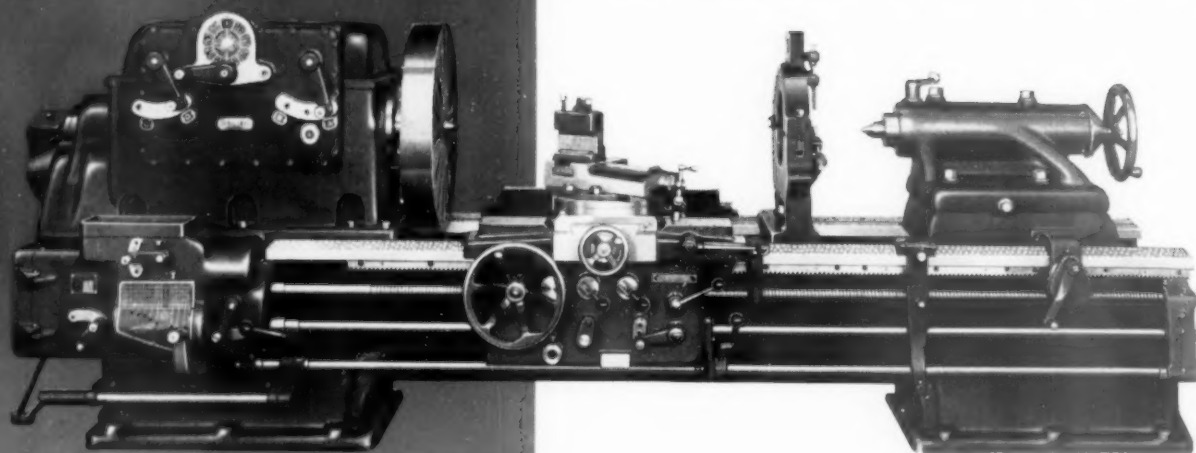
Jarvis Power Tools as used in the manufacture of engines, propellers, planes, ship and instruments have done their part.

**THE CHARLES L. JARVIS CO., MIDDLETOWN, CONN.**

TAPPING ATTACHMENTS • FLEXIBLE SHAFT MACHINES • GROUND ROTARY FILES

# **SPEED and POWER** for your Heavy Duty Work

# **SIDNEY** <sup>30"</sup><sub>36"</sub> **LATHE**



## **FEATURES**

Center bearing on spindle and intermediate shaft.

48 changes of threads from  $\frac{1}{4}$  to 46 per inch.

48 changes of feeds from .003" to .207" per revolution of spindle.

Force feed lubrication to headstock—apron mechanism—carriage and bottom slide.

Twin-disc driving clutch and brake.

Double Wall Apron with anti-friction bearings and force feed lubrication.

## **16 Speed HERRINGBONE GEARED HEAD**

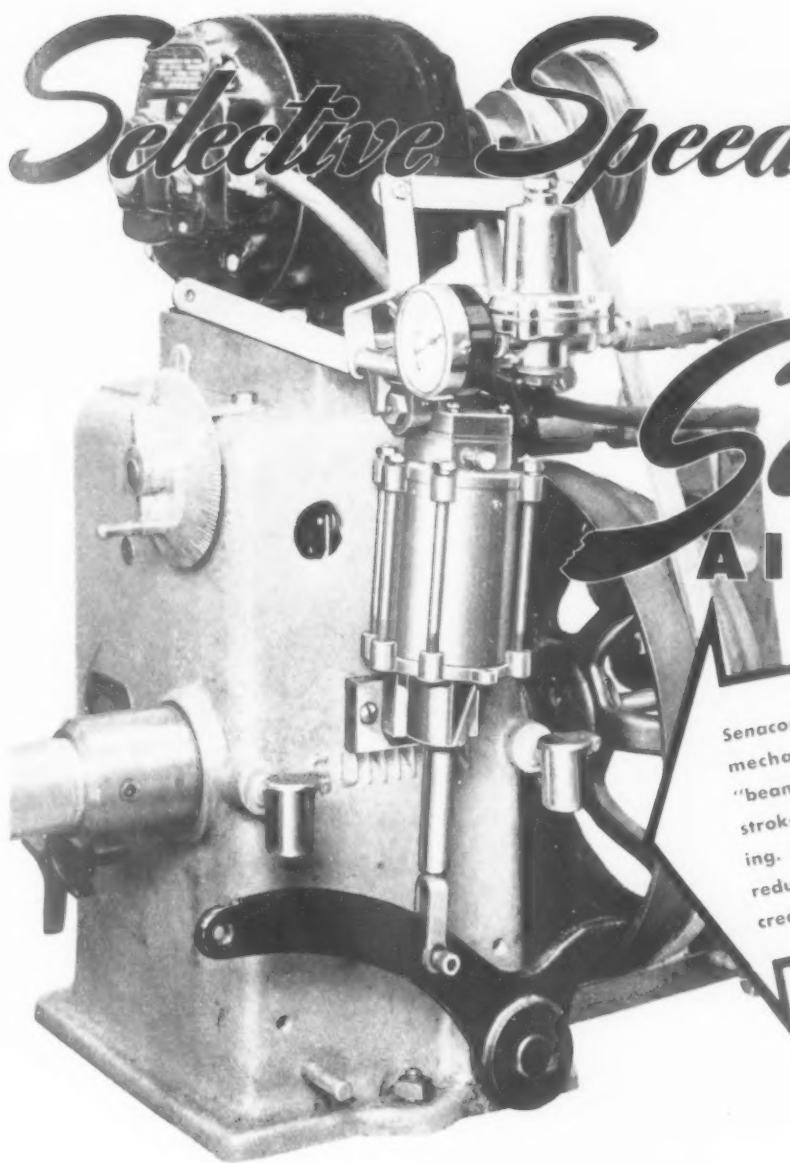
This exclusive headstock design provides sixteen selective spindle speed changes with continuous tooth herring bone gears that are in constant mesh. Various speeds are obtained by engagement of sliding clutches operating on multiple spline shafts. Spindle is made of alloy steel forging, heat-treated and mounted on Timken Precision Bearings which take both radial and thrust loads and insures a true running spindle under most severe demands.

**The SIDNEY MACHINE TOOL Company**  
**SIDNEY U.S.A. OHIO**

# *Selective Speed Control*

WITH

# *Senacon* AIR MOTORS



Senacon AM-25 Air Motor operating clutch mechanism on Sunnen Hone. Adjustable "beaning" of exhaust port on extension stroke gives any desired rate of clutch closing. Uniform powered operation of clutch reduces operator fatigue and materially increases stone life.

Thousands of Senacon Air Motors in daily use are supplying auxiliary fractional horsepower to all types of shop equipment.

## Dual Exhaust Ports

The exclusive dual exhaust feature of *Senacon Air Motors* provides accurate adjustment of the rate of piston rod extension and retraction by simple "beaning" of the proper exhaust port. Independent regulation markedly increases the efficiency of many powered-fixtured operations. A typical example is the *Senacon-powered* clutch of a Sunnen Hone where slow closing is essential to long stone

life, and rapid opening speeds production. *Senacon-powered* equipment increases production and decreases operator fatigue. *Senacon Air Motors* with universal integral valves offer the tool engineer countless opportunities for applying controlled auxiliary power to all types of machine tools. Write for new bulletin illustrating the wide versatility of these units.



## SMITH-JOHNSON CORP.

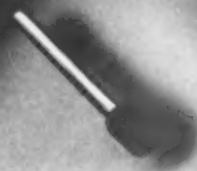
Bendix Bldg. • Los Angeles, California

## SPEED PRODUCTION WITH AIR POWER



# NORTON SERVICE

*for Grinding  
Your Carbide Tipped Tools*



**T**here are three types of Norton wheels used for grinding the cemented carbides. Each has its field. For example: *metal bonded diamond wheels* for the off-hand grinding of single point tools; *resinoid bonded diamond wheels* for sharpening multi-blade tools such as milling cutters; *Crystolon wheels* for many roughing operations.

Norton abrasive engineers are familiar with all three types and their proper application. To obtain their help contact direct or through your Norton distributor.

**NORTON COMPANY, WORCESTER, MASS.**

*Distributors in All Principal Cities*

## Grinding Wheel Recommendations FOR CARBIDE TOOLS

### Offhand Grinding (Single Point Tools)

Cup Wheels:	
Combination roughing and finishing (wet)	120 Diamond Metal Bonded
Roughing (dry)	3760/1-I7 CRYSTOLON vitrified.
Roughing (wet)	100S Diamond Metal Bonded or 100-B25 Diamond Resinoid or 3760/1-J7 CRYSTOLON vitrified.
Finishing (dry)	37100-H7 CRYSTOLON vitrified.
Finishing (wet)	220 Diamond Metal Bonded or 220-B50 Diamond Resinoid Bonded or 37100-H7 CRYSTOLON vitrified.
Straight Wheels:	
Roughing (dry)	3760/1-I7 CRYSTOLON vitrified.
Roughing (wet)	3760/1-J7 CRYSTOLON vitrified.

### Machine Grinding (Single Point Tools)

Cup Wheels:	
Roughing (wet)	3760/1-I7 CRYSTOLON vitrified.
Finishing (wet)	3790/1-H7 CRYSTOLON vitrified.
Straight Wheels:	
Roughing and Finishing (wet)	3780/1-J7 CRYSTOLON vitrified.

### Chip Breaker Grinding

Straight Wheels:	
Roughing and Finishing (wet)	120-B100 Diamond Resinoid Bonded.

### Cutter and Reamer Grinding

Cup Wheels:	
Backing Off (Sharpening)	220-B100 Diamond Resinoid Bonded.
Straight Wheels:	
Ingensoll Cutter Grinder	120-B100 Diamond Resinoid Bonded (10 x 1/4 x 1").

### Surface Grinding

Straight Wheels:	
Roughing (wet)	100S or 150 Diamond Resinoid Bonded or 3760/1-I7 CRYSTOLON vitrified.
Roughing (dry)	3760/1-I7 CRYSTOLON vitrified.
Finishing (wet)	220 to 400 Diamond Resinoid Bonded, depending upon finish desired or 37100-I7 CRYSTOLON vitrified.
Finishing (dry)	37100-H7 CRYSTOLON vitrified.

### Cylindrical Grinding

Roughing (wet)	
100S Diamond Resinoid or 3760/1-K7 CRYSTOLON vitrified.	
Finishing (wet)	
100S to 400 Diamond Resinoid Bonded, depending upon finish desired, or 37100-J7 CRYSTOLON vitrified.	

### Internal Grinding

100 to 400 Diamond Resinoid, depending upon finish desired (available mounted on spindles in smaller sizes).

### Hand Honing or Stoning

Rectangular Stick: 220 or 320 Diamond Resinoid hand hone, or 37280-N CRYSTOLON Stick.

### Cutting Off

100S or 120 Diamond Metal Bonded for long life; Resinoid Bonded for fast cutting.

You'll find much helpful information in the Norton booklet "Grinding Carbide Tipped Tools"—a complete chapter on the selection and use of each type of wheel. Just ask for Form 167B.

**NORTON ABRASIVES**

# Checked and Rechecked

## To Insure Time-saving Performance!



**Parker-Kalon Socket Screws undergo a rigid check-up routine that can only result in time-saving performance**

A Quality-Control routine—without counterpart in the screw industry—weeds out screws that fail to meet the high standards of quality established by Parker-Kalon. This check-routine begins with careful analysis of the raw material and follows through to the final manufacturing operation. It gives Parker-Kalon Socket Screws a degree of dependability that helps to make every working hour count in scores of war production plants, yet it costs no more to specify Parker-Kalon! Parker-Kalon Corp., 190-198 Varick Street, New York, N. Y.


### *Quality-Controlled*

Complete test and inspection routine covers: Chemical Analysis; Tensile and Torsional Strength; Ductility; Shock Resistance under Tension and Shear; Hardness; Head diameter, height and concentricity; Socket shape, size, depth, and centrality; Thread fit. Every detail is double-checked to assure the highest degree of workability.

## PARKER-KALON

*Quality-Controlled*

## SOCKET SCREWS



Give the Green Light

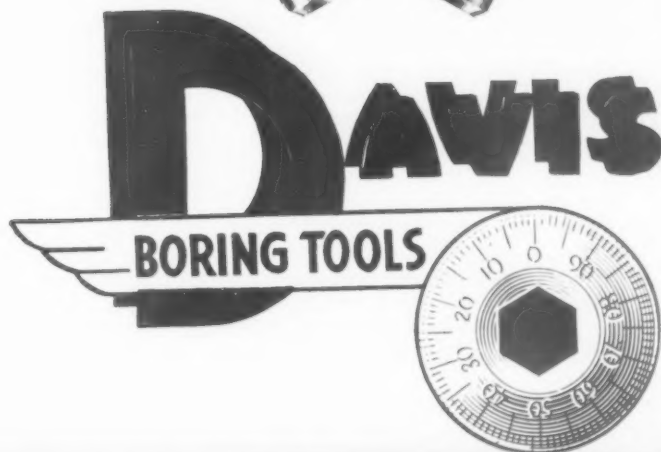
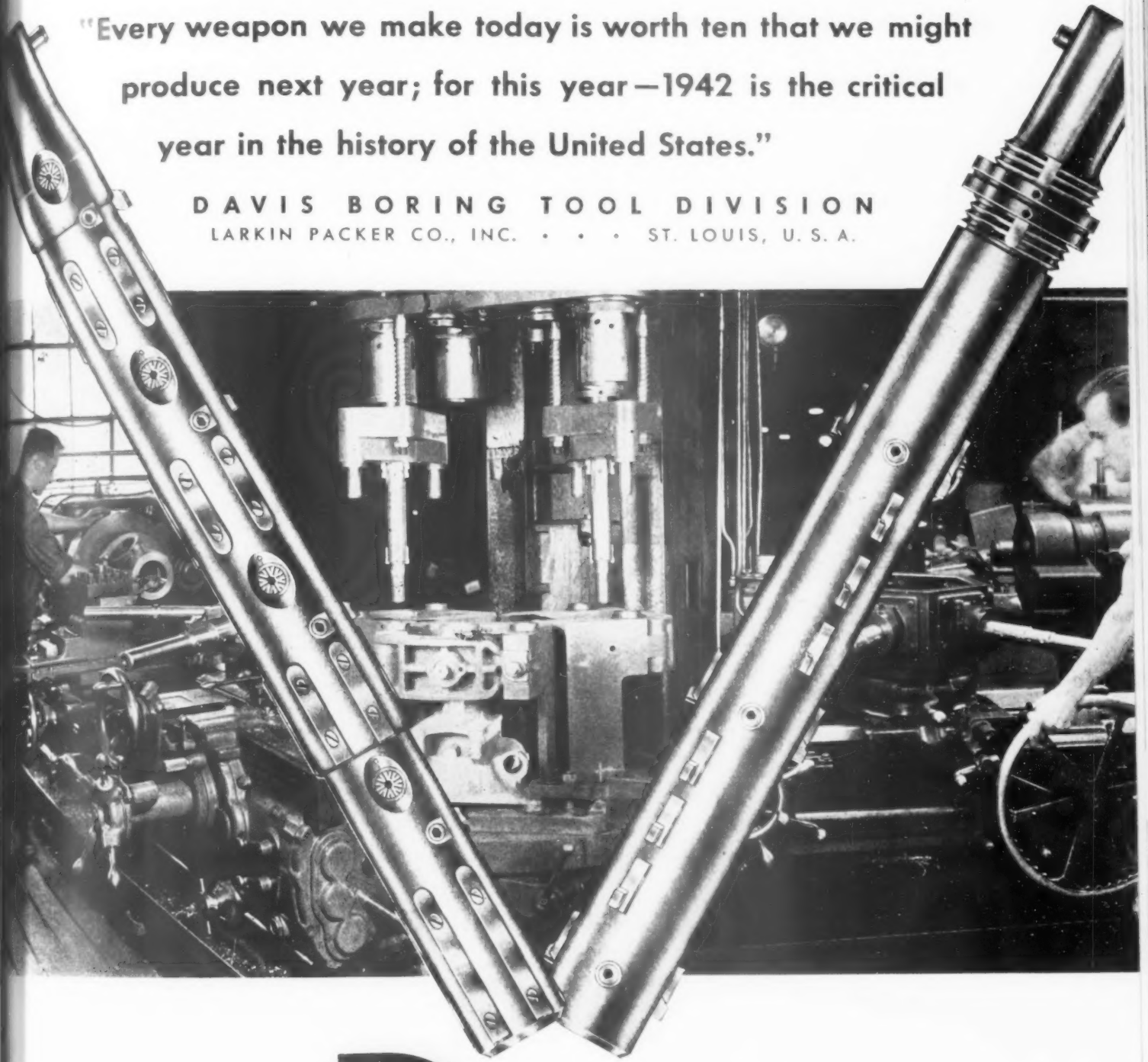
to War Assemblies

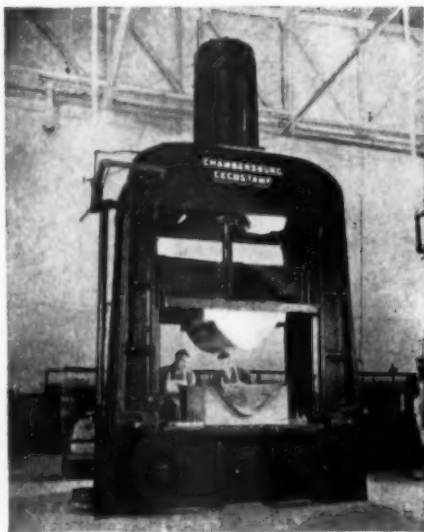
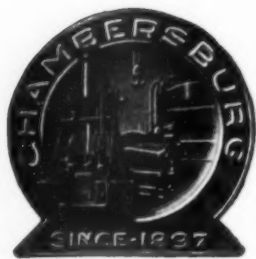


# *Victory in* **PRODUCTION** *Means* *Victory in* **BATTLE!**

"Every weapon we make today is worth ten that we might produce next year; for this year—1942 is the critical year in the history of the United States."

**DAVIS BORING TOOL DIVISION**  
LARKIN PACKER CO., INC. • • • ST. LOUIS, U. S. A.





#### THE CECOSTAMP

*The modern drop stamp for difficult forming of high strength steel and aluminum alloy sheet metal parts.*

**H**IGH STRENGTH metals, such as stainless steels and many aluminum alloys, present a forming problem that taxes the most modern type of stamping machinery. Many forms cannot be drawn without a great deal of difficulty—other forms must be shaped without drawing as no reduction of section is permitted!

The Cecostamp provides a means for forming these difficult metals with fewer operations and greater true-to-die accuracy. The Cecostamp permits the operator to control the metal flow of stamping and thus produce shapes without drawing and the reduction of sectional areas.

Controlled stamping overcomes the resiliency of these hard-to-form metals and gives them a permanent set at a greater rate of production.

A new publication, just off the press, shows examples of Cecostampings and details of their production. Just write for a copy of "Cecostampings".

## FORGINGS COME FIRST



*Forging Tank Parts on a  
Chambersburg Hammer*

**W**HEN the President called for 185,000 airplanes in the two years 1942 and 1943, he was calling for some 500,000,000 drop forgings. *These come FIRST!* For example, before the powerful, accurate, sweet-running airplane engine can be put together, most of its vital parts—crankshaft, camshaft, connecting rod, etc.—start

as pieces of glowing steel, formed by the impact of the drop hammer into close-limit, light-weight drop forgings of unbelievable toughness and strength. Chambersburg Hammers in hundreds of plants are forging night and day for final victory—and more are being shipped every month for the same purpose.

CHAMBERSBURG ENGINEERING CO. • CHAMBERSBURG, PA.

# CHAMBERSBURG

## HAMMERS • CECOSTAMPS • PRESSES



# AUTOMATIC CHUCKING EQUIPMENT

answers the call for faster  
precision production.....

A roll call of shops producing implements of war would find many Potter & Johnston Automatic Chucking Machines turning out accurate duplicate parts and maintaining high production hour after hour, day and night.

And day and night the great Potter & Johnston plant is rushing the building of more and more machines to reinforce those already handling war production.

Every day sees parts in greatly increasing quantities being produced to exacting specifications on P&J Automatic Chucking Equipment—for airplanes, airplane engines, machine guns, anti-aircraft guns, the Bofors gun, the American Oerlikon gun and other emergency needs.

P&J was ready, by long specialized experience, proved equipment and versatility in tooling to meet the demands of vastly stepped-up production.

the POTTER & JOHNSTON MACHINE CO.  
PROVIDENCE, RHODE ISLAND

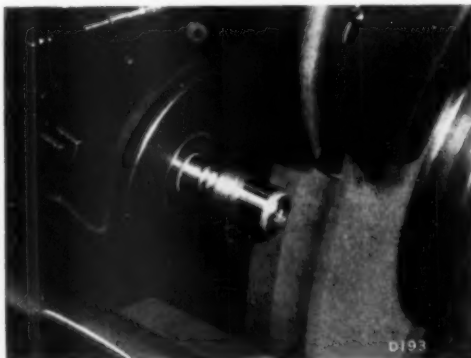


To Finish The Job Quicker . . .



## KEEP YOUR GRINDERS OPERATING NIGHT AND DAY

*A chuck body being ground on a Landis 6" x 18" Type C Plain Grinder. Production averages about 275 pieces per hour. Accuracy is held within a limit of .0005 while .0015" stock is removed during the finishing operation.*



*Help keep our weapons rolling by keeping your grinding wheels turning night and day. Keep your grinding wheels turning by installing grinding machines that are famous for low maintenance and continuous service.*

*Three years ago several Landis 6" Type C Plain Grinders were installed in the plant of a chuck manufacturer. There they are kept in operation 147 hours a week. Concerning their performance the plant manager recently stated that "one of the outstanding features of these machines is the fact that maintenance expense has been zero."*

*Night and day these grinders are giving their owners constant, low cost service. And what they are doing in this plant, they can do in yours.*

*Unusual Performance  
As Usual*



**LANDIS TOOL CO. WAYNESBORO, PENNSYLVANIA.**



MICROSPHERE  
WHEEL, SPINDLE  
BEARINGS



MULTI-SPEED  
HYDRAULIC  
TABLE  
TRAVERSE



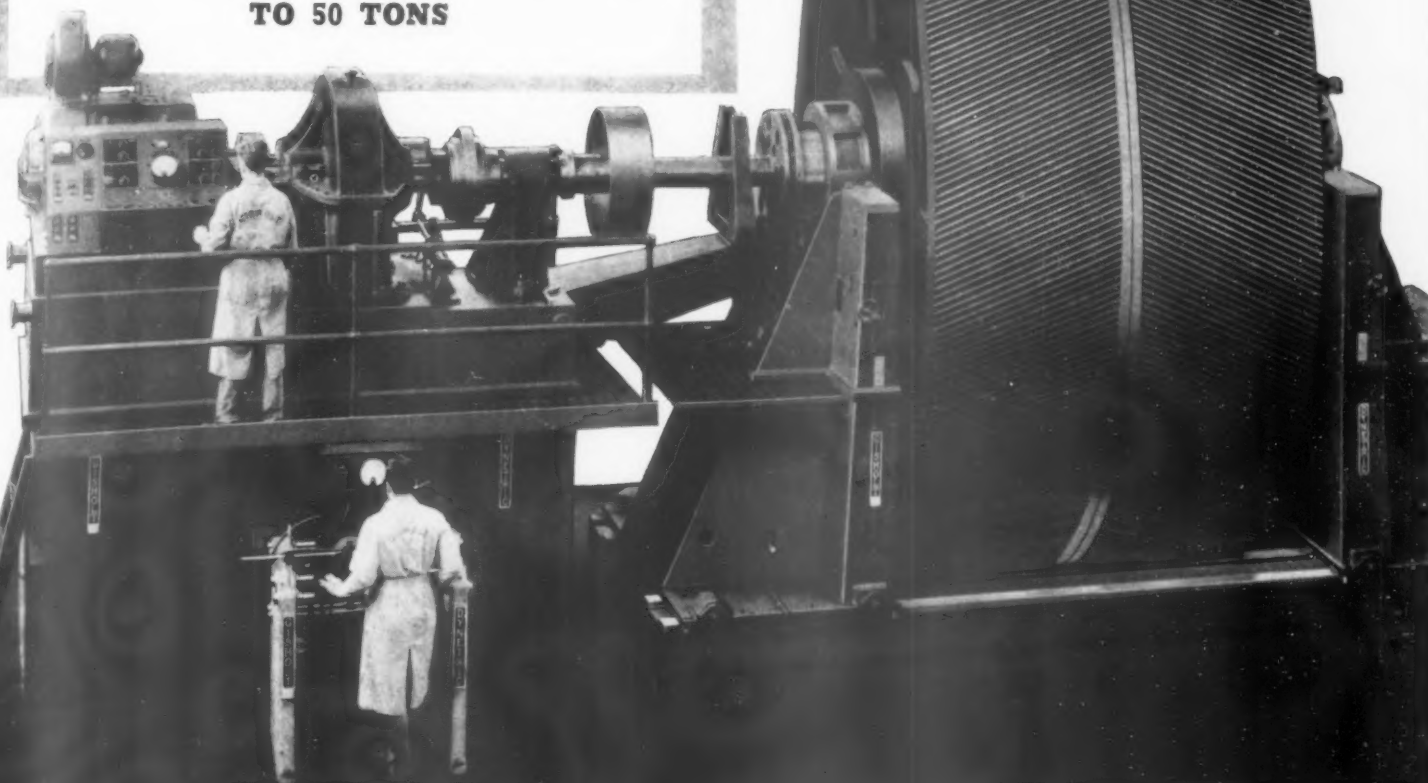
HYDRAULIC  
STRAIGHT  
INFEED

IF IT

# ROTATES

IT CAN BE BALANCED!

**GISHOLT DYNETRICS NOW PROVIDE  
A COMPLETE RANGE OF SIZES FOR  
BALANCING ANY PART FROM 1 OZ.  
TO 50 TONS**



## THE TYPE S DYNETRIC

the smallest of the entire line, has now been perfected to the point where it performs balancing operations on parts as small as 1 ounce in weight.

## THE NEW FLOOR TYPE DYNETRIC

largest of its kind, is shown here balancing a huge marine reduction gear. This massive herringbone has a 16' 8" diameter, face width of 7' 4", and total weight of 100,000 pounds.

The new Floor Type Dynetric is built to accommodate parts up to 240 inches in length or requiring a swing of 200". Typical of Gisholt research and development, it is a noteworthy contribution to America's war production effort.

The Gisholt principle of Dynetric Balancing is the proved and practical means of reducing vibration and excessive wear to insure more efficient performance and longer life.

These newest developments extend its advantages in both directions—down to parts as small as 1 oz. in weight and upward to those weighing as much as 50 tons. Whatever your problem in correcting for true static and dynamic balance, Gisholt Dynetrics answer it. Full information on request.

GISHOLT MACHINE COMPANY, 1229 E. Washington Ave., Madison, Wis.

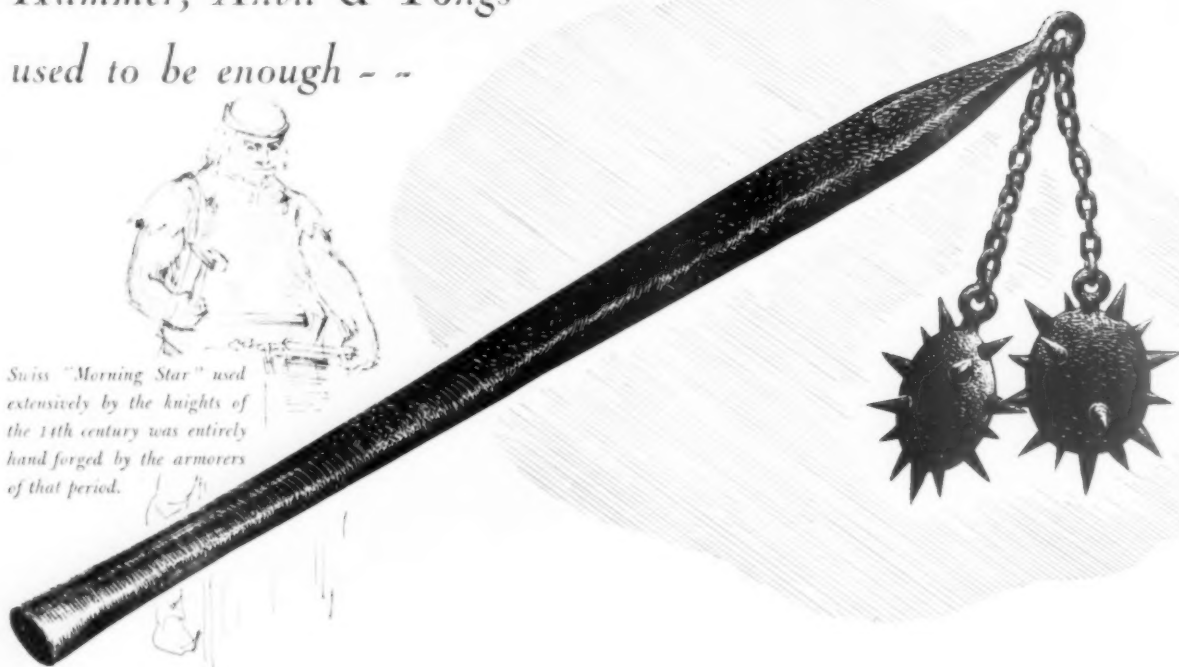
LOOK AHEAD • KEEP AHEAD • WITH GISHOLT IMPROVEMENTS

TURRET LATHES • AUTOMATIC LATHES • BALANCING MACHINES



*Hammer, Anvil & Tongs*  
used to be enough - -

Swiss "Morning Star" used extensively by the knights of the 14th century was entirely hand forged by the armorers of that period.



## -- BUT PRODUCTION OF MODERN WEAPONS DEMANDS DEPENDABLE TOOL STEELS

Tool steel plays an essential part in every step of the complex manufacturing operations required to complete the tanks, planes, ships, guns and all the other implements of modern warfare. Tool steel performance must be dependable to avoid loss of production, time and the waste of materials. Coppco tool steels are making good dependability records. We would like to discuss your tool steel requirements with you.



THE WILL TO MAKE  
GOOD STEEL  
**COPPERWELD STEEL COMPANY • WARREN, OHIO**







Like hundreds of other plant items, even the best chucks—or anything else for that matter—wear out *some* time.

If new stocks are scarce and your want is immediate, you "need a friend" in a big hurry. *Here he is*, all set to give you the help you need—just call the Representative of your nearby Industrial Supply Distributor.

For, even if *he* hasn't any in stock, he is almost sure to know many possible sources that may be closed to you. So

This incident is typical of the unusual services that many Mill Supply Distributors are rendering their customers during the Emergency.

when he says "don't worry—we'll scout up an emergency supply for you if there's any in town," you can be sure he will make every effort to keep you going. And usually he will *succeed*.

It's good business to take your own Distributors into your confidence and use them all the time. We know, because for many years they have been *our* Sales Representatives

on Cle-Forge High-Speed Drills and Peerless High-Speed Reamers throughout Industrial America.

The **CLEVELAND** TWIST DRILL COMPANY  
TRADE MARK REG. U. S. PAT. OFF. AND FOREIGN COUNTRIES  
 30 READE ST. NEW YORK 9 NORTH JEFFERSON ST. CHICAGO 650 HOWARD ST. SAN FRANCISCO  
 6515 SECOND BLVD., DETROIT LONDON - E. P. BARRUS, LTD. - 35-36-37 UPPER THAMES ST., E.C.4



"CLEVELAND" DISTRIBUTORS EVERYWHERE ARE READY TO SERVE YOU

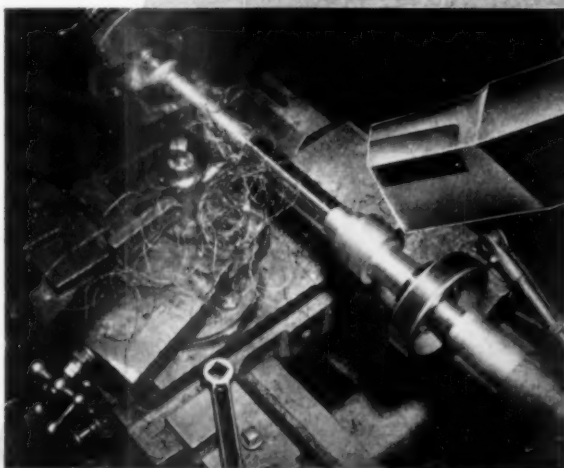


Vascoloy  
**RAMET**

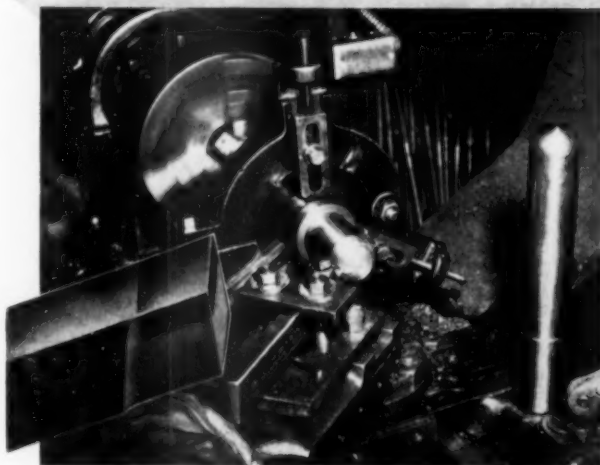
# 5-METHOD

**COMPLETE TOOL SERVICE**  
*for* **MAXIMUM PRODUCTION**

*Small Shop Converts to War Work  
Using Method One*



Turning gun parts at high speed  
using style 11 carbide tipped tool.



Turning nose of shell forging plug  
using modified style 15 tool.

The conversion of this small shop to the production of shell and gun parts is a typical example of the application of Method One of the Vascoloy - Ramet Complete Tool Service. In using Method One this shop uses some standard tools as they are furnished and also modifies others.

With all the standard tools available in Method One, and the almost countless number of modifications possible, this method offers the easiest way to tool up for the majority of boring, turning and facing operations on aluminum, cast iron, and steels. The standard tool most closely meeting requirements is withdrawn from stock and used as it is or modified by grinding to the desired shape. Simplified tooling practice recommends this Method One wherever possible.

For fast tooling, keep in stock a supply of Vascoloy-Ramet standard tools. Catalogue VR-421 will help you to select the standard tools you should have. Write for your copy.

**VASCOLOY-RAMET CORPORATION**  
NORTH CHICAGO, ILLINOIS

DISTRICT SALES AND SERVICE IN PRINCIPAL CITIES  
IN CANADA: Carbide Tool & Die Company, Ltd., Hamilton, Ont.

4260

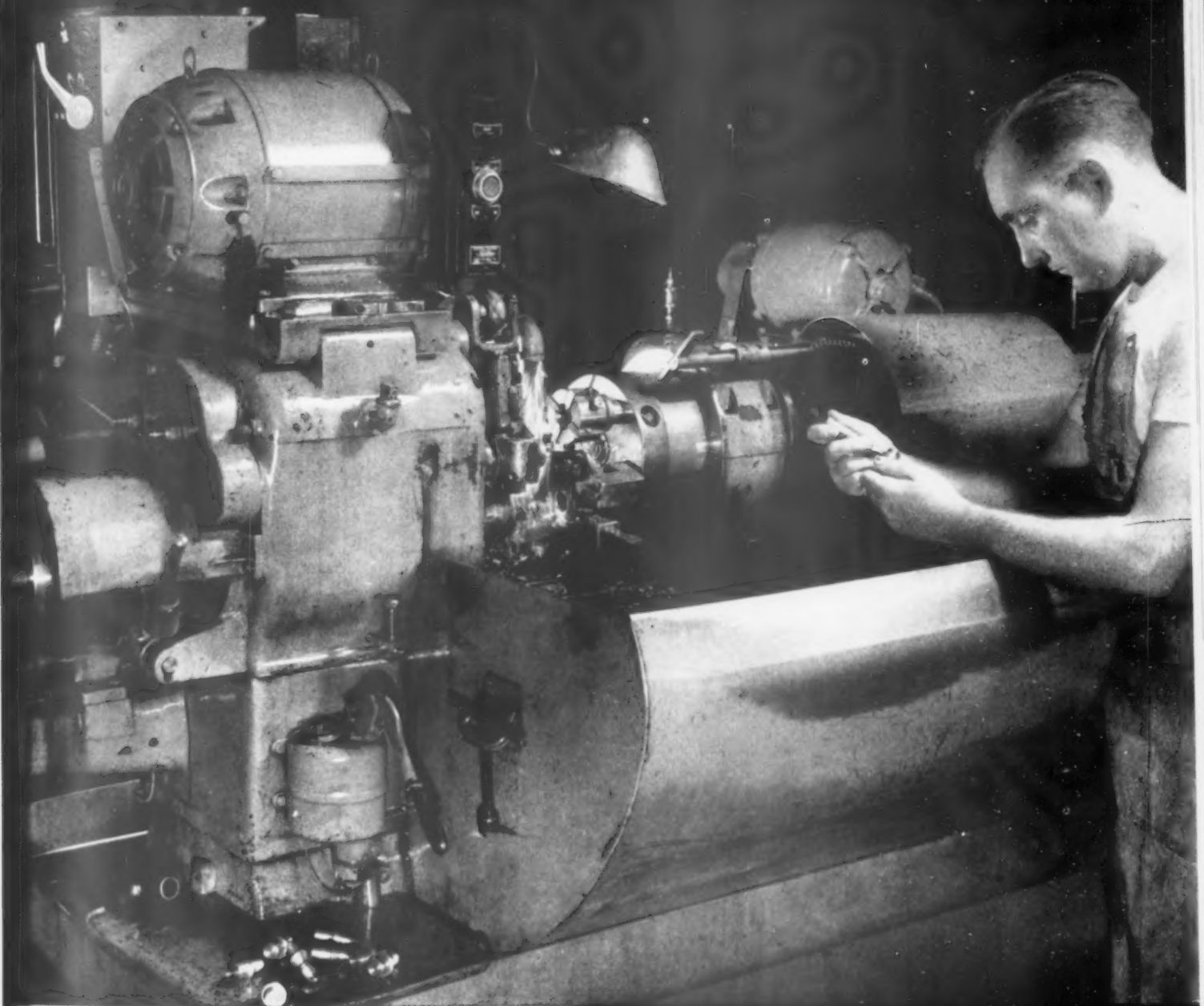
TANTALUM-TUNGSTEN CARBIDE  
**FOR TOOL SERVICE..... Specify**

Vascoloy  
**RAMET**

**TOOLS**  
TANTUNG "G"

THE TOOL ENGINEER

ROCK ISLAND ARSENAL EXACTS "ALL OUT"  
PERFORMANCE FROM A NEW MODEL 'A'  
CLEVELAND *Single Spindle* AUTOMATIC



• Never known to "baby" their old Cleveland Automatics, the Rock Island Arsenal machinists gave this new one "the works" right after it was installed. With some of the finest machinists in this country in this shop, and with a full assortment of America's finest machine tools, a machine has to be soundly built, carefully engineered and thoroughly dependable to stand up to requirements. It may be said that this 13½-inch Model A, Cleveland *Single Spindle* Automatic, is "in the Army now." • It will always be easily tooled up and readily accessible for repairs and maintenance; it was built that way. It was designed to do a job and do it well even under the strenuous conditions of today's production demands. And it really is a hog for work, in any size you use.

THE CLEVELAND AUTOMATIC MACHINE COMPANY  
2289 ASHLAND ROAD, CLEVELAND, OHIO

Sales Offices at  
Chicago, 548 W. Washington Street • Detroit, 840 New Center Bldg.  
Newark, 702 American Insurance Bldg. • Cincinnati, 807 American Bldg.

CLEVELAND  
*Single Spindle*  
AUTOMATICS



# THREADWELL DOES IT!

## THREADWELL LICKS TOUGH THREADING JOBS MAKING "FULL FORM" BRITISH TAPS

Many American industries are working on orders for Great Britain where British form of thread is required. Here at Threadwell all Whitworth, British Standard Fine and British Association High Speed Taps as small as No. 10 B. A. are ground with a true "Full Form".

For long life and accuracy these taps are unsurpassed. Their manufacture requires the highest standards of workmanship and the most modern equipment. Threadwell has both - - and will continue to turn out these "Taps of Distinction" in an all-out effort for final victory.

THREADWELL TAP & DIE COMPANY  
Greenfield, Massachusetts, U. S. A.

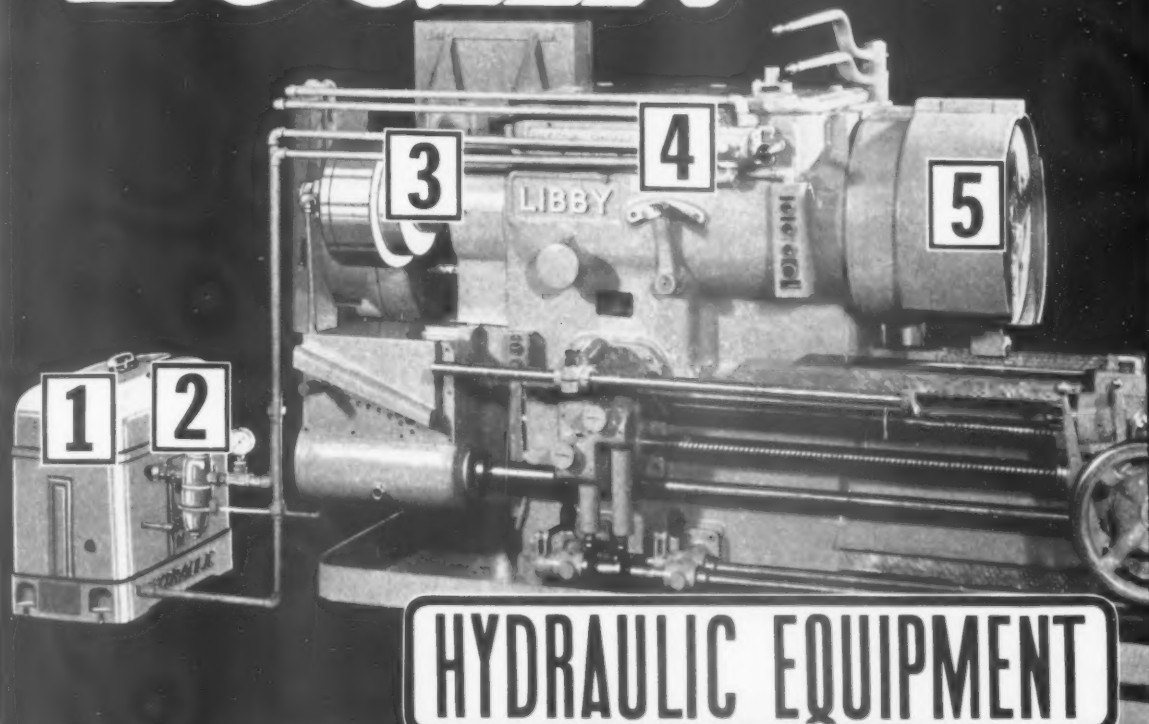
*Threadwell*

THE NEW NAME FOR  
SUPERLATIVE THREADING



SALES AGENTS: *Canada* - BRIDGE MACHINERY COMPANY, *Montreal*. *England* - SKYLUX, LTD., *London*.

# **"LOGAN"**



## **AS APPLIED TO A LIBBY TURRET LATHE**

**1** "LOGAN" Model 5022  
Hydraulic Power Unit

**2** "LOGAN"  
Reducing Valve

**3** "LOGAN" Model "HR"  
Hydraulic Cylinder

**4** "LOGAN" Model 4095  
Control Valve

**5** "LOGAN"  
3-Jaw Chuck

This Libby Turret Lathe, manufactured by the International Machine Tool Corporation, is equipped with a "LOGAN" Hydraulic Power Unit as an entirely independent source of fluid power supply, which assures constant pressure for the continuous and efficient operation of the "LOGAN" Hydraulic Cylinder. A Rotating Type "LOGAN" Hydraulic Cylinder actuates a "LOGAN" 3-Jaw American Standard Chuck. For controlling the action of the hydraulic cylinder, a "LOGAN" 4095 Balanced Four Way Piston Type, Hand Operated Valve is used. "LOGAN" Representatives and "LOGAN" Engineers will be glad to make recommendations on your hydraulic problems.

**LOGANSPORT MACHINE, INCORPORATED**

902 PAYSON ROAD

LOGANSPORT, INDIANA

Manufacturers of Air and Hydraulic Devices, Chucks, Cylinders, Valves, Presses and Accessories

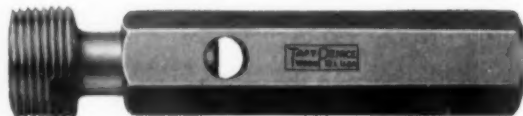
U. S. Inspectors of  
Armament Production \*\*\*



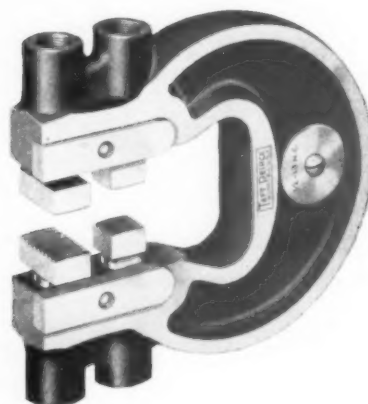
LIMIT RING THREAD GAGES



LIMIT PLUG THREAD GAGES



TAPER PIPE THREAD GAGES



ADJUSTABLE THREAD SNAP GAGES

## TAFT-PEIRCE THREAD GAGES

YEARS AGO, the first educational shell orders called up for service the Taft-Peirce line of Thread Gages. Since then, the Taft-Peirce Thread Gage Department has doubled, redoubled — now reaches a size where it has had to be moved into a six-story plant of its own, adjacent to the main plant.

Here, production shifts into higher speed than ever, assuring prompt service on the complete Taft-Peirce Thread Gage line, which includes all AGD Standards and many special types. This line is shown in the Taft-Peirce Handbook. A line on your letterhead brings a copy to your desk. The Taft-Peirce Manufacturing Company, Woonsocket, Rhode Island.



**USE TAFT-PEIRCE GAGES**

*for every gaging need*



# STELLITE 98M2 METAL-CUTTING TOOLS

## *For Machining Steel... Available for Immediate Deliveries...*

Stellite 98M2 tools are made of a cobalt-chromium-tungsten alloy especially designed to increase the speed of machining steel. Developed by Haynes Stellite Company and Union Carbide and Carbon Research Laboratories, Inc., Units of Union Carbide and Carbon Corporation, this new alloy represents another achievement in the production of non-ferrous alloy cutting tools.

**Tested on War Production**—Stellite 98M2 tools have been thoroughly tested in the machining of many types of steel parts needed in the war program and are now being used for a wide variety of operations on such parts. Specific operations for which Stellite 98M2 alloy tools have proved especially suitable include turning, facing, boring, grooving, and forming of all types of steel.

**High Rates of Metal Removal**—These tools have proved that they will machine steel at even higher cutting speeds than Stellite Star J-Metal tools or Stellite "2400" tools, and with longer life between grinds. With the new tools, heavy roughing cuts can be taken with coarse

feeds—and to get high rates of metal removal—yet tool life is long and economical, for this new alloy has an *unusually favorable balance of red hardness, edge strength, and toughness.*

**Available Forms**—Stellite 98M2 tools are furnished as standard square and rectangular tool bits and welded-tip tools. Many sizes and types are available for immediate delivery. In addition, Haynes Stellite Company is prepared to furnish special tools made of this alloy, cast and ground to customers' specifications.



Send for this new descriptive price list. It will help you select the sizes and styles of Stellite 98M2 Metal Cutting Tools you require.



## HAYNES STELLITE COMPANY

*Unit of Union Carbide and Carbon Corporation*

New York, N. Y.



Kokomo, Indiana

Chicago—Cleveland—Detroit—Houston—Los Angeles—San Francisco—Tulsa

• HIGH-PRODUCTION METAL-CUTTING TOOLS •

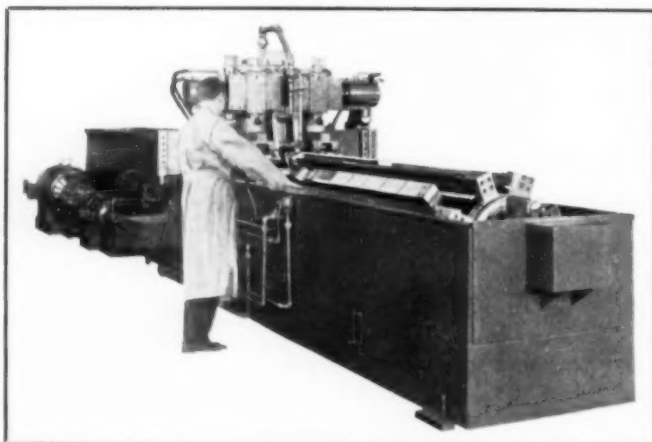
The words "Haynes Stellite," and "Stellite" are registered trade-marks of Haynes Stellite Company

OCTOBER, 1942

# 6 BROACHING OPERATIONS *with* 1 MACHINE SET-UP...



## ...ON 75MM CANNON BREECH BLOCK



... "Somewhere in the Middle West," a mammoth gun plant is producing breech blocks for 75 MM Cannon with the aid of the special AMERICAN broaching machine shown to the left. This machine was furnished complete with hydraulic fixtures and tooling for the operation. The revolving broach handling cradle can be seen to the front of the machine. This machine facilitates broaching one of the large breech blocks while another is being loaded on the opposite side of the special fixture. Compared to machining these blocks by conventional methods, production obtained is very high.

**A** **AMERICAN BROACH & MACHINE COMPANY**  
 ANN ARBOR, MICHIGAN, U. S. A.  
 BROACHING MACHINES, PRESSES, BROACHING TOOLS, SPECIAL MACHINERY

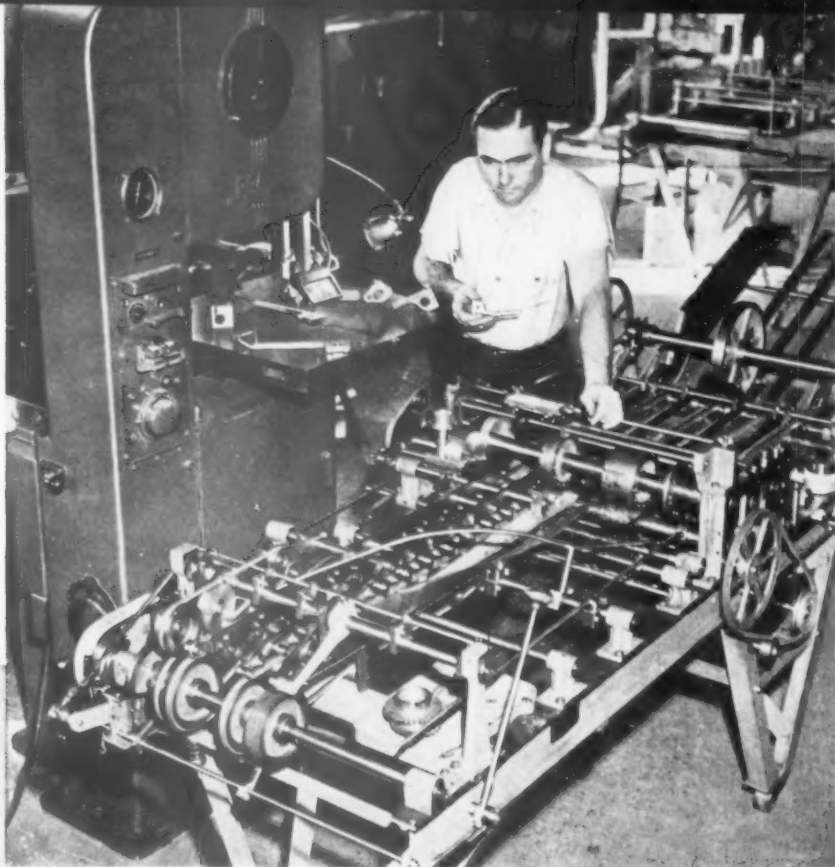


# WHY WAIT WEEKS FOR TOOLS or PARTS?

*Make them the  
Same day on a*

# DoAll

25 different parts of this Automatic Paper File Folding Machine are now made on the DoAll — and without blueprints.



All external and internal shape cutting in making these special parts and molds was done on the DoAll.



A large airplane plant makes these Propeller Wrenches on the DoAll.

In addition to doing a fine job in regular production work, the DoAll is the 100% patriot today to which you can turn in emergencies.

Don't tie up vital machines for weeks waiting for replacement parts from the factory. Make them on the DoAll—the fastest precision method for external and internal cutting without waste, of all kinds of metals, alloys, plastics, wood, etc. Finished jobs are ready for use—further machining is not necessary.

The DoAll makes special tools and dies, following a hairline layout in the least possible time. Short runs of metal products can be handled on the DoAll, relieving heavier, higher-priced machine tools for other work. Sheet metal or alloy can be stacked and 20 to 80 parts cut out at one time.

## ASK FOR DEMONSTRATION

A factory-trained man will call with a DoAll and show you its production versatility, economy and time-saving features.

**READ THIS BOOK**—Send for a copy of "DoAll on Production", a picture story of this little giant of industry.

## CONTINENTAL MACHINES, Inc.

1304 S. Washington Ave., Minneapolis, Minn.

Associated with the DoAll Company, DesPlaines, Illinois, Manufacturers of Band Saws and Band Files for DoAll Contour Machines

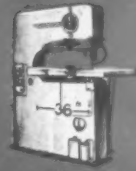
32 Stitching Dies 1 1/4" thick cut from oil hardening tool steel in 23 1/2 hours on the DoAll.



Under \$5000



Under \$2500



Under \$2000



Under \$1500



Under \$1000

THE EXACT SIZE FOR YOUR JOB

Pat. No. 2,255,577  
Des. No. 127,313  
Other Pats. Pending



# H

# N ?



**PLAN-O-MILL**  
FORM AND TAPER MILLING MACHINE  
WITH COMPLETE FEED CONTROLS

- ✓ VERSATILE
- ✓ ACCURATE
- ✓ FLEXIBLE
- ✓ DURABLE
- ✓ ECONOMICAL
- ✓ PRODUCTIVE
- ✓ EFFICIENT
- ✓ EASY TO OPERATE
- ✓ RAPID

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# I

If you have any job that involves external or internal threading, or cylindrical forming, this book may show you how Plan-O-Mill can do it faster, with equal or greater accuracy!

Generously illustrated, this new catalog clearly describes Plan-O-Mill's remarkable milling principle . . . shows how it can go profitably to work for you. Floor-to-floor time cut 88 percent! Indicating eliminated! Push-button ease of operation! These are only a few of the Plan-O-Mill achievements enumerated.

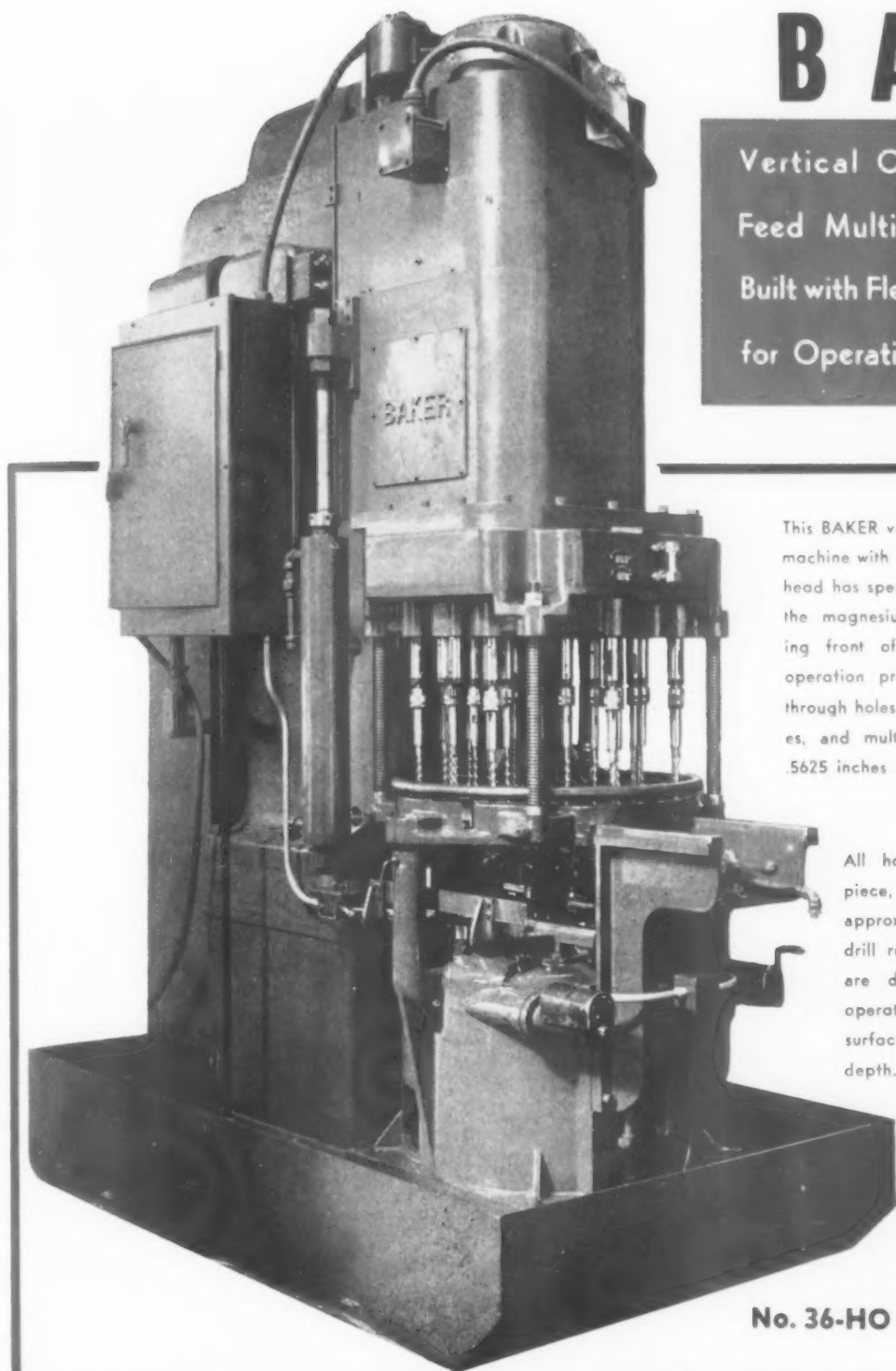
Call or write your local Plan-O-Mill distributor (listed at left) for your copy. **PLAN-O-MILL CORPORATION**, Washington Square Building, Royal Oak, Michigan.



# *Adapted to Exacting Requirements*

## **BAKER**

Vertical Cleanline Hydraulic  
Feed Multiple Spindle Drillers  
Built with Flexibility for Retooling  
for Operations on Other Parts.



This BAKER vertical cleanline hydraulic feed machine with 19-spindle, fixed center, multiple head has special fixtures for multiple drilling the magnesium casting supercharger-housing front of aircraft engines. Here the operation problem is to multiple drill 13 through holes with a diameter of .3125 inches, and multiple drill 6 through holes of .5625 inches diameter.

All holes are drilled through the piece, but the depth of the holes is approximately  $5\frac{3}{4}$  inches. To hold drill run down to a minimum, holes are drilled from both ends. The operator chucks part with the front surface up and drills all holes  $\frac{1}{2}$  depth.

The part is then turned over in the same fixture and the holes are drilled through. Fixture is designed to permit rechucking.

**No. 36-HO**

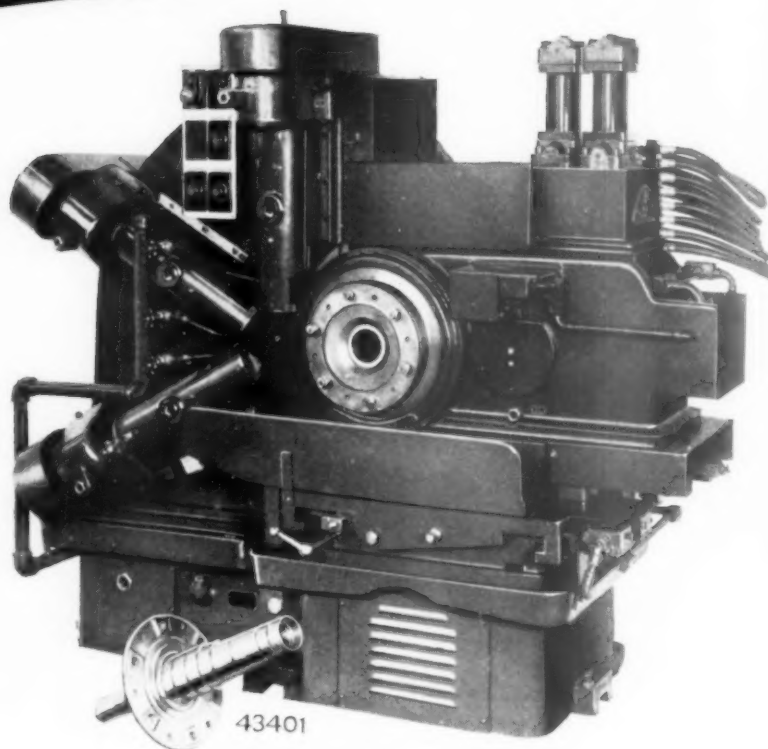
WRITE FOR NEW CIRCULAR AND ENGINEERING DATA SHEET

**BAKER BROTHERS, INC. TOLEDO, OHIO, U. S. A.**

DRILLING - BORING - TAPPING - KEYSEATING - CONTOUR GRINDING MACHINES

# A 3-SPINDLE ROTARY MILLING MACHINE

**Automatic  
Indexing  
•  
Full  
Hydraulic  
Operation**



**T**HIS machine is used in milling an undercut in the circular shoulder section of a turned propeller shaft hub, to produce six elevated rest pads. The machine is equipped with three milling spindles. The tools have tapered shanks, and, because of their small size, are further supported by out-board bearing.

The work cycle is as follows:

The work-piece is loaded and clamped in position hydraulically. The cycle starter button is pressed and the entire fixture assembly and work-piece are automatically moved by hydraulic power, along the main slide, into milling position.

When this position is reached, a transverse sub-slide, also hydraulically operated, automatically brings the workpiece into contact with the tools and feeds it forward until the required cutting depth is reached. The piece is then automatically rotated through the specified cutting arc.

When the first three cuts are completed, the fixture automatically retracts and rotates the work-piece 180°, into position for the second three cuts.

Upon completion of the six rough cuts, the fixture again retracts and the entire fixture assembly moved to the right, affording visual inspection of cutters and finish. The operator then throws a small lever which starts the machine through an identical second cycle in which the finish cut is made. The finish cut blends with the adjacent surfaces.

The entire operation is fully automatic except for loading and unloading and the throwing of the lever between first and second cycles. The rotation of the fixture during the milling cycle is accomplished through heavy duty hydraulic cylinders which give an adjustable feed rate for milling.

This is a typical example of how Snyder engineering service solves complex processing problems. If you have a production problem to which a special automatic machine might be the answer, we invite your inquiries.

## **SNYDER**

**TOOL & ENGINEERING CO.**

3400 E. Lafayette Ave. • Detroit

*designers and builders of machinery  
for **HIGH** production at **LOW** unit cost*



# BROACHING ADVANCES CONTINUOUSLY

**B**ROACHING, which has taken its place among machining methods as a process of great resource, is making continuous advances under the lash of war demand.

New methods of using broaching—new problems solved by it—greater speed—more economy—advances along these lines are of almost daily occurrence.

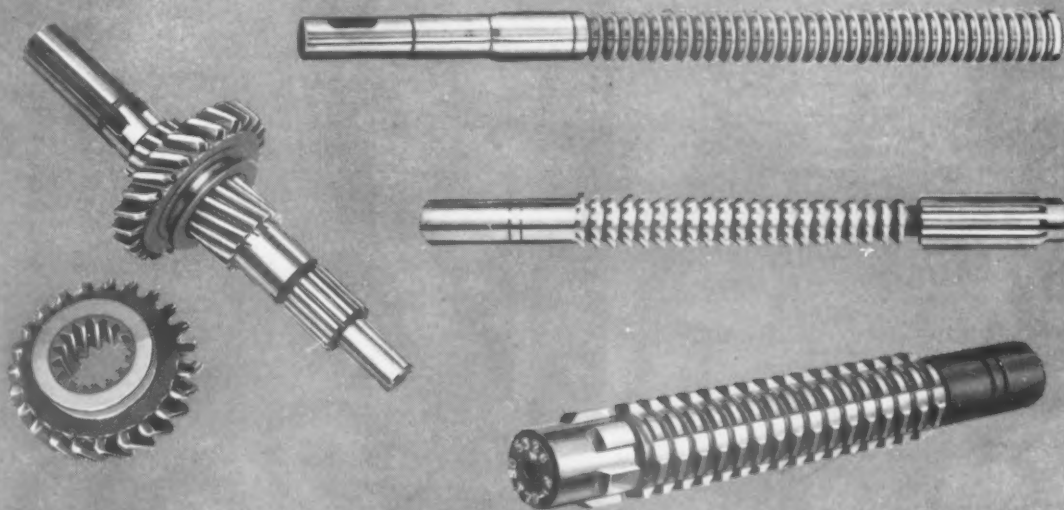
The Red Ring Double Jump Broach opens an entirely

new field of operation, making notable savings in time and tool cost. Red Ring Broaching of multiple involute splines for universal joints and other machine elements permits high strength-weight ratio, and operation with minimum back-lash.

Naloy steel and improved design have provided broaches of amazing ability to stand long runs with a minimum number of regrindings.

When you consider machining methods, consider broaching—and—get the latest information on broaching.

*National Broach and Machine Company has pioneered much of the high production broaching. We have accumulated engineering experience that will be valuable to you. We'll be glad to consult.*



**NATIONAL BROACH  
AND MACHINE CO.**

RED RING PRODUCTS  
5600 ST. JEAN - DETROIT, MICH.

SPECIALISTS ON SPUR AND HELICAL  
INVOLUTE GEAR PRACTICE

ORIGINATORS OF ROTARY SHAVING  
AND ELLIPTOID TOOTH FORMS

**ACTUAL REPORTS SHOW**

**Big Increase in Production of  
TOOLS • DIES • PRECISION PARTS**

*with* **DESPATCH FURNACES**

This is no time to compromise with production. Speedy, accurate heat treatment is needed to achieve the output of tools and dies scheduled for this year.

Actual reports show that greater production of tools, dies and precision parts is attained after the installation of Despatch furnaces.

Investigate the advantages of Despatch heat treating furnaces for your plant. 64 standard models, gas or electric, pot type or batch type furnaces available for prompt delivery. Also special models to suit any material handling necessary.



**"Torrid"**

**The Heat Wizard**

Invites you to visit the  
Despatch Booth No.  
A-415, National Metal  
Congress, Cleveland,  
October 12th to 16th.



Despatch Batch Type Furnace, gas heated, processing steel springs in a midwestern metal plant



Battery of Despatch Pot Type Furnaces, electrically heated, processing bearing parts at a large eastern plant

**DESPATCH**  
OVEN COMPANY MINNEAPOLIS, MINNESOTA

# **SHARPEN TOOLS**

# *Correctly!*



## **CORRECT SHARPENING IS THE FIRST ESSENTIAL FOR TOOL CONSERVATION AND HIGH PRODUCTION**

- Bent or bowed arbors cause cutter runout, reducing the efficiency of the tool.
- Establish regular resharpener periods.
- Keep cutter close to the spindle.
- Use the smallest diameter cutter possible to do the job.
- Investigate machine conditions when breakage occurs.

Remember! There is economy in keeping tools properly sharpened. They will cut faster, last longer, use less power and produce more accurate work with superior finish than if used when in dull condition.

### **ILLINOIS**

#### **High Speed Production Tools**

Hobs • Broaches • Shaper Cutters  
Milling Cutters  
Ground Form Tools • Special Tools

★ ★ ★

Gear Measuring Machines  
Gear Measuring Blocks  
Die Filing Machines

# **ILLINOIS TOOL WORKS**

**MANUFACTURERS OF METAL**  
2501 N. Keeler Avenue, Chicago, Illinois

**CUTTING TOOLS AND SHAKEPROOF PRODUCTS**  
In Canada: Canada Illinois Tools, Ltd., Toronto, Ont.



**HALF of Last Year's Purchasers have  
ordered ADDITIONAL machines  
because the**

# LIPE

## PNEUMATIC BAR FEED

*definitely increases screw machine output!*



**T**IME and again we've told you that this faster, easier and safer Pneumatic Bar Feed would step-up your screw machine output. We said that screw machine operators in plants all over the country were claiming production increases ranging from 10% to 30%. But now here's word from the owners and plant managers. And they say it with RE-ORDERS—back their opinions with money because the Lipe Pneumatic Bar Feed has definitely proved its worth as a production booster.

The Lipe Pneumatic Bar Feed can be installed on any screw machine having a fixed stop. It's safe, simple and reliable. Automatically feeds an entire stock bar with but one setting. Stock is entirely enclosed. No whipping ends to catch clothing. No guards needed.

Bothersome feed parts—fingers, collars, ratchets, etc.—all are eliminated. It's accident proof. Feed power cannot be applied until the cylinder is locked in working position.

● Investigate now. Don't let another day pass until you find out why other plants are ordering and re-ordering this valuable production aid. A nearby Lipe technical representative will call on request.

1. Feeds entire bar to last remnant.
2. Feeds accurately, rapidly any distance.
3. Will not feed short.
4. Will not scratch or mar the stock.
5. Exact size polished stock can be used.
6. Saves from 15 to 20 minutes per 12' bar.
7. Easily and quickly reloaded.
8. Shipped complete, ready to use. Just connect to shop air line.
9. Available for all manual screw machines up to 2½" capacity. Also for automatic screw machines No. 00, No. 0, No. 2 and No. 6.



● The Lipe Pneumatic Bar Feed consists of an air cylinder long enough to enclose a full-length stock bar. A piston within the cylinder carries a ball-bearing cup center to support the free end of the stock bar. As the collet is opened, low-pressure air moves the piston, advancing the bar to the fixed stop. The action is fast and accurate.

**LIPE-ROLLWAY CORPORATION • SYRACUSE, N. Y.**

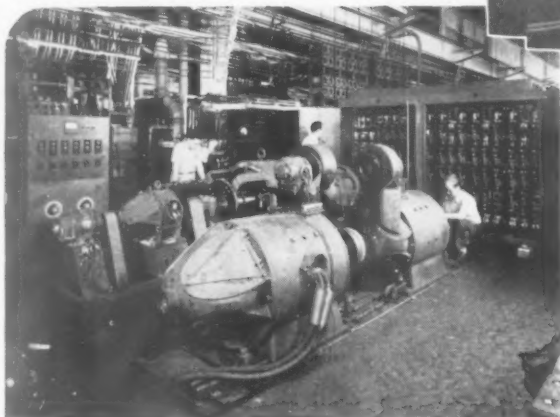
**PLANER PRODUCTION**

**STEPS UP**

**STAYS UP**

**AS HIGH AS 44%**

**THE NEW  
WESTINGHOUSE  
VARIABLE VOLTAGE  
DRIVE WITH ROTOTROL**



**COMPLETE DRIVE IS TESTED AS  
A UNIT BEFORE SHIPMENT**

All equipment for the Westinghouse Variable Voltage Drive . . . induction motor, variable voltage generator exciter, Rototrol, planer motor and control panel are tested as a complete unit under simulated operating conditions at the factory before shipment.

Faster cutting strokes, faster returns, accurate stops . . . all boost planer production to new highs. Rototrol, the patented Westinghouse regulating generator, improves production speeds, isolates the drive from fluctuations of the a-c power supply. Even when the cutting load changes, the speed of the table remains the same. The table stops and reverses at precisely the same spot on every stroke, permitting planing up to shoulders and in blind pockets on precision work as well as on rough bedplate work.

Speed ranges of 30 to 1 and higher allow the most economical cutting and return speeds to be set in order to take full advantage of the long life and superior performance of newly developed tool steels.

Fewer contactors, relays and interlocks are required with Rototrol. And these parts operate fewer times per cycle. Result: Wear is reduced proportionately . . . time-outs for maintenance and repairs are cut down.

Ask your Westinghouse representative for all the facts. Or write for B-3064, Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., Dept. 7-N.

J-21246



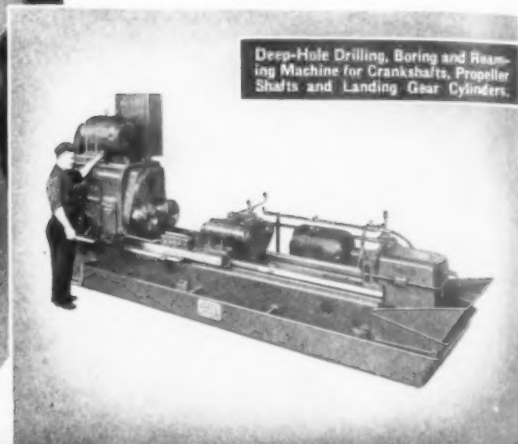
**Westinghouse**

**VARIABLE VOLTAGE DRIVES**

# In The Heart Of America



Your requirements may affect machine design. We can assist in determining and building the machine best suited to your needs.



Deep-Hole Drilling, Boring and Reaming Machine for Crankshafts, Propeller Shafts and Landing Gear Cylinders.

## WE ARE BUILDING PRODUCTION MACHINE TOOLS *For the Aircraft Industry*

● To the Aircraft Industry, whose products are so vital to a complete victory by the Allied Nations, we offer a line of machine tools for aircraft manufacture. Whether your requirements are for strut boring and honing, drilling and boring crankshaft lightening holes, crankcase or cylinder drilling or boring, boring of cam and crankshaft bearings, accessory housing drilling and boring, or special machining operations, W. F. and John Barnes Company can furnish machines for the job.

Write today — for further information or send us your part prints with specifications and we will be pleased to quote you on a machine to fulfill your requirements.



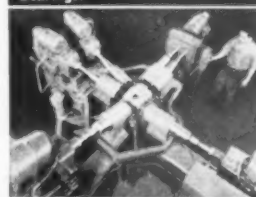
FOR EXCELLENCE... W. F. and John Barnes Company takes pride in announcing the privilege of flying the "E" flag.



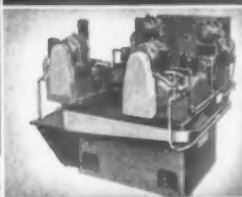
Precision Machine for Boring and Facing Main and Accessory Shaft Bearings.



Cylinder Head Drilling and Forming Machine.



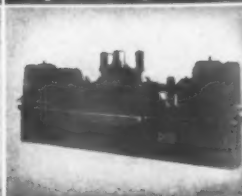
Unit-Type Precision Boring and Facing Machine.



Special Machine for Tapping Engine Mounting Pads.



Crankshaft Drilling, Boring and Chamfering Machine.



Double End Crankshaft Recentering Machine.

### W. F. and JOHN BARNES

325 SOUTH WATER STREET • ROCKFORD, ILLINOIS, U. S. A.



# Help Them Win...Turn in Your SCRAP!



3 MILLION TONS OF  
IRON AND STEEL SCRAP  
WANTED THIS MONTH!

Scrap is steel or iron useless in its existing form but valuable as *raw material* for remelting. Since it is already refined, more scrap in the furnace charge speeds up the refining process and enables steel to be turned out faster for implements of war... More scrap—from your plant—means more steel.

#### Conservation Authorities Recommend the Following 8 Steps

1. Put some one individual in charge of scrap in all departments of your business and GIVE HIM AUTHORITY TO ACT.
2. Comb the plant and yards for dormant scrap, abandoned equipment, old boilers, pipe, moulds, obsolete dies and parts, material now being destroyed which has salvage value.
3. Survey all plant equipment, particularly idle standby or discarded machines, with a view to applying or converting them to useful production.
4. **SEGREGATION:** Identify, classify and segregate scrap and supervise its handling to avoid contamination. This will increase its value. Provide separate containers, clearly marked for each class of scrap material.

Repair or rework worn or broken cutting tools. Keep unusable small pieces and turnings segregated. Even high speed steel grinding dust is valuable.

Dismantle discarded equipment promptly into its components—electrical, fastenings, lumber, etc.—so that these parts may be utilized or scrapped.

Sort blanks, short ends, cut-downs, clippings, etc., for possible reuse for smaller parts made in the same or other departments.

Recover and reclaim used cutting oils, lubricants, surplus paints and spray finishes.

Sort sweepings and miscellaneous waste to recover scrap values.

5. **Constant** reminders in the form of posters, illustrations of right and wrong methods, pay envelope enclosures, house organ publicity, etc., are potent aids to the conservation program.

6. **Release** for scrap, obsolete engravings, electrotypes, and standing types for catalogs, forms and advertising material.

7. **Inspect** all refuse to detect avoidable waste and excessive rejections. Educate production executives to correct such conditions at the source.

8. **For** information and assistance on special phases of conservation and salvage communicate with Industrial Salvage Section, Conservation Division, War Production Board, 9th Floor, Washington Gas Light Building, Washington, D. C., or with nearest regional office.

*The metallurgical experience of our technical staff is available to aid you in these and other technical phases of metal salvage.*

**KEEP SCRAP MOVING INTO WAR PRODUCTION!**

**THE INTERNATIONAL NICKEL COMPANY, INC.** 67 WALL STREET  
NEW YORK, N. Y.

# YOU GET TOP RESULTS WITH DALZEN MACHINE TOOLS



The DALZEN No. 1 Thread Grinder will grind threads up to ten inches in length anywhere on an eighteen inch shaft with a diameter maximum of six inches.

48" WIDE  
38" DEEP  
75" HIGH

The DALZEN combination 2 in 1 Center Grinder and Drill Press combines a dependable, accurate center grinder with a sturdy drill press and can be changed over in a moment from one type of work to another. The Drill Press has a capacity of 1/2 inch. The four-speed, V-belt drive will handle any range of work.



The DALZEN No. 2 Thread Grinder grinds threads up to four inches in length anywhere on an eight inch shaft with a diameter maximum of three inches.

43" WIDE  
39" DEEP  
72" HIGH



Shown above are some of the broaches and taps manufactured by DALZEN. The broaches are made in rounds, flats, or form. The taps are Whitworth and British Association form.

## DALZEN TOOL & MFG. CO.

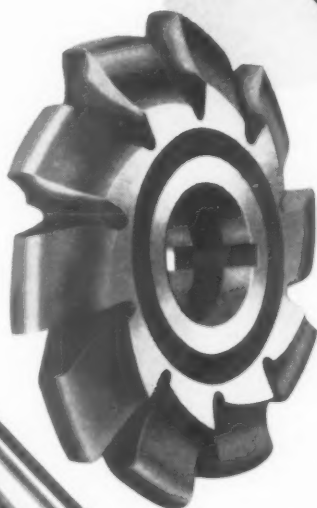
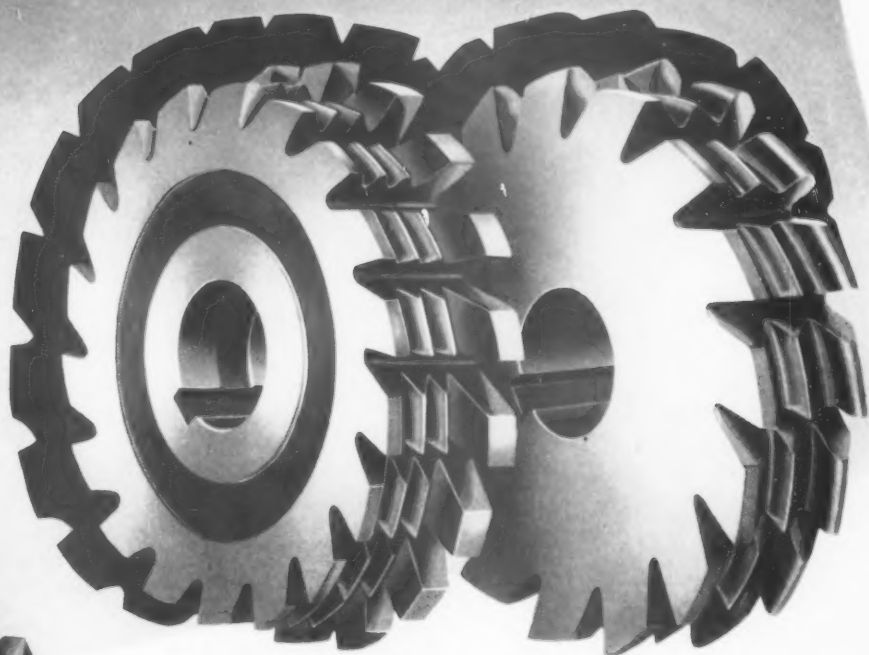
12255 E. 8 MILE ROAD

DETROIT, MICHIGAN

# FORM RELIEVED CUTTERS

*are economical when you have to mill intricate shapes and outlines*

**MIDWEST**



## WHEN CONSIDERING FORM CUTTERS, NOTE THE FOLLOWING:

There are an infinite number of shapes, both symmetrical and irregular in outline, which can be milled efficiently and economically with Midwest Form Relieved Cutters. These cutters, provided with eccentric relief behind the cutting edges, always maintain the original outline of form when they are sharpened by grinding the faces of the teeth. However, conditions are so varied in the application of form cutters, no definite rules can be offered for making a proper selection as to type and form. When considering form cutters, send a blueprint of part to be milled; outline the cutter on the surface to be milled; furnish all dimensions of the form shown, with tolerances; specify arbor diameter, keyway size, and rotation. On unsymmetrical forms, designate below the outline, rotation, as "bottom going" or "bottom coming." Whenever possible, form cutters should have undercut teeth, the degree depending upon operating conditions. When sharpening a form cutter, the amount of undercut which is marked on the cutter should be preserved, since the form was corrected for this exact amount of rake . . . Other examples of Midwest Form Relieved Cutters may be found in Midwest's catalog 17 of Precision Metal Cutting Tools.

*Your Security and Freedom depend on your Country Winning the War. There is no alternative. Your Country needs your Fighting Dollars for Victory. Invest them Now in United States Bonds and Stamps.*

END MILLS • SLEEVES • COUNTERBORES • SPECIAL TOOLS • DRILLS  
REAMERS • FORM TOOLS • CARBIDE TIPPED TOOLS • ADJUSTABLE HOLDERS

# MIDWEST *Precision*

**METAL CUTTING TOOLS**

MIDWEST TOOL & MFG. CO. • 2364 W. JEFFERSON AVE. • DETROIT, MICHIGAN



# LATROBE

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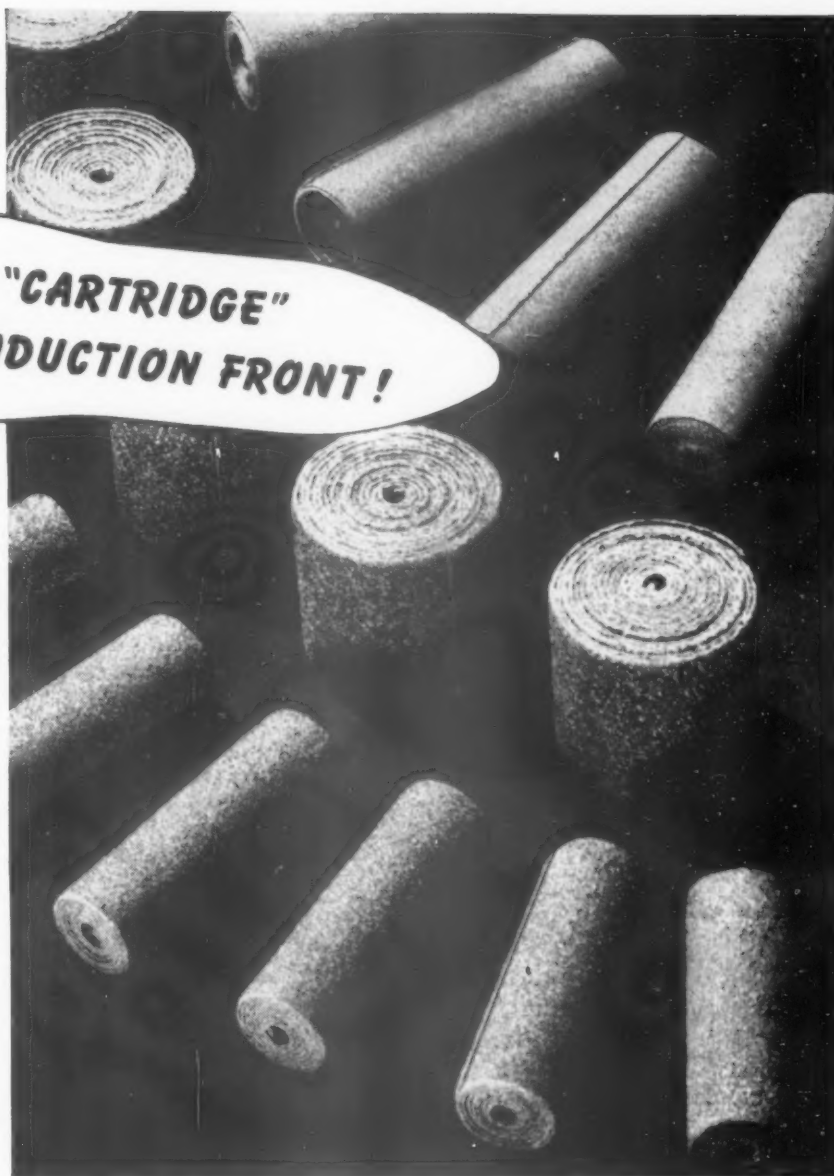
*Write for Bulletin*

**ELECTRIC STEEL COMPANY**

MAIN OFFICES *and* PLANT • LATROBE • PENNSYLVANIA

THE TOOL ENGINEER

**A NEW TYPE OF "CARTRIDGE"  
FOR THE PRODUCTION FRONT!**



**N**EVER before has the metal working industry been called upon to grind, finish or polish such a bewildering variety of parts, fittings and finished products. And never before has there been such a demand for improved metal finishing techniques.

To supply this demand and enable users to keep pace with war production demands, The Carborundum Company has developed many new and novel coated abrasive devices — Weapons for Production, which make possible faster production at lower cost.

One of the most interesting of these is the cloth cartridge roll for finishing otherwise hard-to-get-at surfaces. It is simply a tightly wound glued strip of metal working cloth. The center bore formed by the winding is easily pressed onto a spindle of suitable diameter and length. It is then ready to use on a flexible shaft, air or electric tool.

Sizes range from  $\frac{3}{8}$ " to 1" in diameter and 1" to 3" in length. Grit sizes range from 24 to 320.

These rolls have been found exceptionally effective in finishing, cleaning or polishing out-of-the-way surfaces that are hard to reach, yet must be finished.

The cartridge roll operates much like a mounted abrasive wheel but has the added advantage of being some-

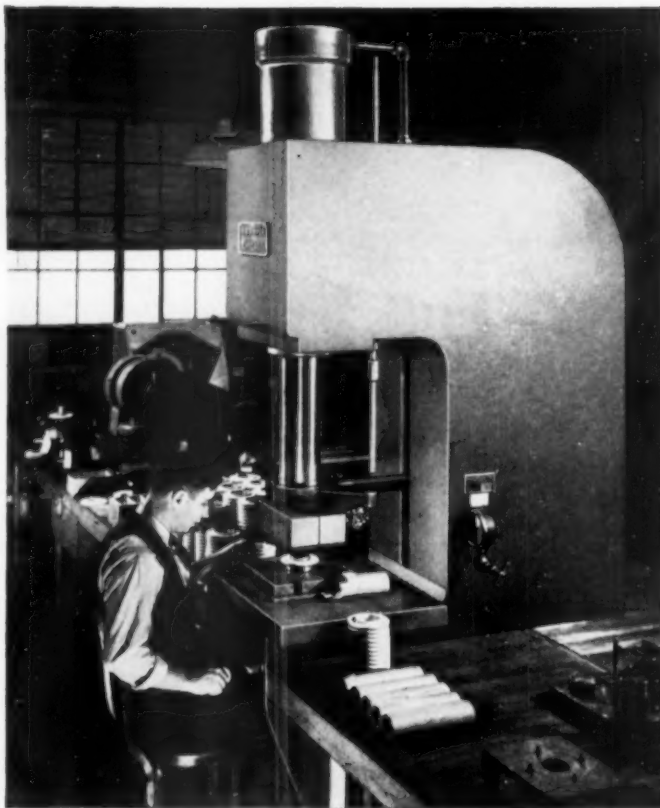
what resilient. It is also economical and long-lived. As the abrasive surface wears down the cloth backing can be unwound and torn off to expose a fresh layer of abrasive.

If you care to see and feel and try one of these cartridge rolls we will be glad to send you one free of charge. Simply address your request to Dept. The Carborundum Company, Niagara Falls, N. Y.



**THE CARBORUNDUM COMPANY, NIAGARA FALLS, N. Y.**

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25-ton Hannifin hydraulic press used for assembly of insulators, an accurate and delicate operation.

75-ton Hannifin hydraulic press being used for mounting industrial truck tires.

These presses are adapted to a variety of other work.



*faster*  
press-assembly

**H**ANNIFIN hydraulic presses, being used for many different types of press-fit assembly work, provide the simple accurate control that allows high production rates to be consistently maintained. In the two examples shown here the Hannifin sensitive pressure control allows the operators to exert the exact *ram pressures* required for correct pressing to position at a finger-tip touch of the control lever. Note, also, that since only a portion of the available ram stroke is required on these jobs the adjustable stroke control is set for a short stroke, limiting up-travel of the ram and conserving power and time.

Hannifin sensitive pressure control gives the operator complete control of *ram pressures* from a few pounds to full ca-

capacity, at a finger-tip touch of the control lever. This infinitely variable proportional control is so simple and natural that fast, accurate production is far more easily handled than with other methods. An automatic inspection of proper tightness of fit is also possible, as pressing to position with the low ram pressure indicates loose fit, and excessive pressures too tight fit.

Hannifin hydraulic presses are built in a wide range of

Detroit Representative: R. A. BEAN, Hayward Building, 4829 Woodward Avenue

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**HANNIFIN**  
*Hydraulic* **PRESSES**



# THE TOOL ENGINEER

T.M. Reg. U.S. Pat. Office

OCTOBER, 1942

Volume XI, Number 10

## **SABOTAGE**

A WOMAN, whose husband had joined the Army, enlisted for war production. Placed at a machine, she was soon producing beyond average. For this plus production she was sharply criticised, by another worker. The soldier's wife replied that anything short of her best effort was sabotage. That matter came to a head when she was censured for fomenting labor unrest.

There are many of these stories, a 100% too many if but one percent have any basis in fact. One man's production at a given time can vitally affect war's outcome. With no way of forecasting the given time, all production must go full ahead all the time.

This is no time to settle labor arguments. It is the time to produce with all our industrial might so that management and labor may continue their privilege of arguing after victory.

Anyone, be he alien, naturalized or native born, who in any manner slows up war production, is guilty of wilful sabotage. He is as much an enemy agent as one who destroys by violence.

Authorities should investigate any allegation of slow-down and where the fact can be established, the guilty should be summarily dealt with as saboteurs.

## **GAS RATIONS FOR WAR WORKERS**

THE proposed 5000 mile annual driving limit falls short of the objective, which should be to insure transportation for essential war workers. It would be more to the point to ascertain the actual, necessary mileage to and from work — with full enforcement of car pools — instead of setting an arbitrary mileage limit.

One worker may live within walking distance of his job, while another may live 20 or 30 miles away — a not unusual case — with no other means of transportation than his car. With the housing shortage as critical as it is in industrial centers there is no point in suggesting that he move nearer to the plant.

Certainly, restriction is necessary. But let the local ration boards decide the requirements of individual cases. The problem is too big for remote control.

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## **MAJOR GENERAL LEWIS B. HERSHEY:**

THE TOOL ENGINEER this month publishes your advice, as Director of Selective Service, to industry on replacing men because of increasing military needs. You have been generally fair in recognizing industrial needs and have told employers how to obtain deferments for necessary men until replacements are available.

One statement, however, not only indicates a misconception of the training job which industry is doing, but a disregard for irreplaceable men being drafted.

You have said, "The army today has to train a bomber pilot within a period of eight months to operate a very technical machine . . . Why, therefore," you ask, "should industry insist that it assume that it can take two or three years to train men for industrial tasks?"

You have been misadvised. Since December 7, industry is trained itself and trained unskilled help to do totally new jobs. And it is producing for victory now.

Today, industry is teaching unskilled men and women to do a job, and is getting them into production in two or three weeks.

Once at war work, they are "up-graded" through study after shop hours. In training, they often produce war parts. How it is being done is told in our story about Springfield Trade School, along with which your message appears.

Industry is replacing military eligibles with ineligibles. When the too young, the too old, or the physically unfit are not available, industry then takes what it can get to keep production going. It has done little complaining about having to do this job again and again.

A greater problem involves men who cannot be replaced. Draft boards forced to meet quotas, are taking men who possess experience and training that cannot be duplicated in two, three, even ten years. They are men whose creative genius is applied to devising new products, and the tools and methods of their mass production. They are men who can read articles on these methods (and write them as a means of teaching) and apply them toward increasing production. You are drafting these men.

Employers will be doing their duty by appealing in every way open to them for permanent deferment of these men who build bombers, making it feasible for the Army to train pilots.

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ROY T. BRAMSON, Editor and Publisher    JEROME S. WILFORD, Managing Editor    ANDREW E. RYLANDER, Technical Editor  
WALLACE A. SCOTTEN, RALPH E. DAVIS, ALBERT C. COCHRANE, Associate Editors

OCTOBER, 1942

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**TO YOU . . .  
WHO HELPED US WIN THE ARMY-NAVY "E"**

**W**E are proud of the flag now flying above our plant; proud of the Army-Navy "E" pins we are privileged to wear. But, in all fairness, we feel those honors should be shared with you—the users of "G.T.D. Greenfield" tools—Taps, Dies, Gages.

Your patronage made us grow. Your loyalty inspired our progress. That is why War found "G.T.D. Greenfield" ready. When the hour struck, we had both the equipment and the skill necessary for greatly increased output of tools for the building of modern war weapons.

Now, "for the duration," we pledge ourselves to any sacrifice that Victory may demand. Harder work. Better work. Ever increasing production. And we are helped in this resolve by the knowledge that in this crisis, as in the past, we have your backing and co-operation.

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Wright Aeronautical Photos

Row of tool grinders in the Wright Aeronautical plant from which 2,000 hp. engines for giant fighting planes are coming by the thousands.

# Tool Life Increased 20 TIMES

100,000 tests prove cutting tool life can be increased 2,000 per cent by new chip breaker grooves and fine finish cutting faces.

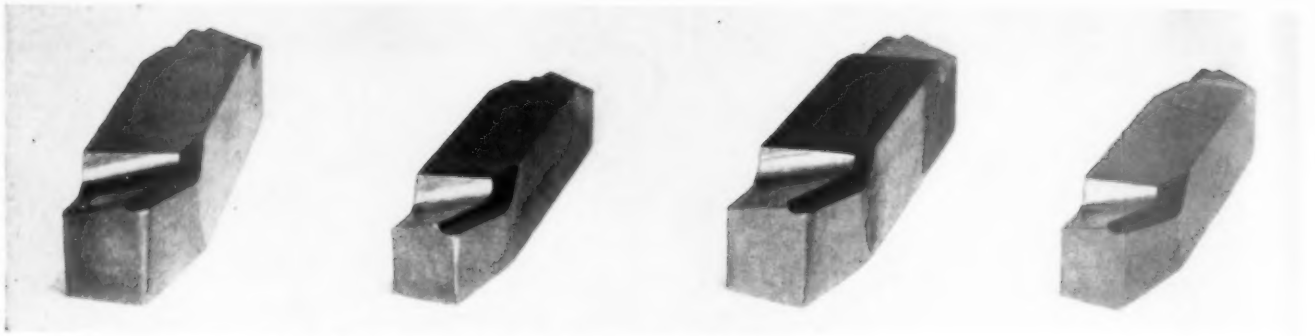
WALLACE A. SCOTTEN

**M**AKING possible the saving of considerable skilled labor in war production and large quantities of vital high speed tool steel, engineers of the Wright Aeronautical Corporation have developed and perfected a new method of grinding which has increased the life of cutting tools as much as 2,000 per cent.

These discoveries, which were the outgrowth of a project in the study of the machinability of various metals, using tools of molybdenum instead of now scarce tungsten and cobalt, may eventually be catalogued among the most notable advances in the science of metal cutting.

Tests by Wright engineers over a period of many months, in which more than 100,000 alloy steel forgings were machined, prove conclusively that lengthening tool life 10 to 20 times is possible on high speed lathe tools through the use of carefully designed





Tools machine ground and honed to extra-fine finish by Wright Aeronautical Corporation method have a cutting life as much as 2,000 per cent longer than those hand ground by individual operators.

chip breakers and ultra-fine finishes on cutting edges.

The system makes use of exact multiple grinding of edges by machine, using "gang" fixtures holding 18 cutting tools against the grinding wheel simultaneously. This eliminates the multiplicity of variation in finishes and angles which result from hand grinding by operators. After multiple rough grinding, the tools are honed one at a time and given a finish that does away with jagged metal "fraying" on the cutting edge which is only microscopically discernible.

The comparative roughness of hand ground and machine ground edges is revealed in the accompanying microphotographs.

Through the careful design and placement of chip breakers on Wright tools, metal sliced away breaks into small chips. Resulting advantages as described by these engineers are interesting. First, the small chips have a tendency to cooler tool operation as they do not stay in contact with the cutting edge as long as curled scrap metal. Also, the coolant running over the cutting area may more easily reach

the actual cutting edge, chips take up less space in the lathe pan and are more easily disposed of.

Tests carried on by the concern in its huge shops in Paterson, New Jersey, have shown startling increases in production per tool before regrinding was necessary. To obtain a record of tool performance and life under working conditions obtainable in any shop, all tools were used on production work and similar care in set-ups were exercised on all operations.

#### Comparison

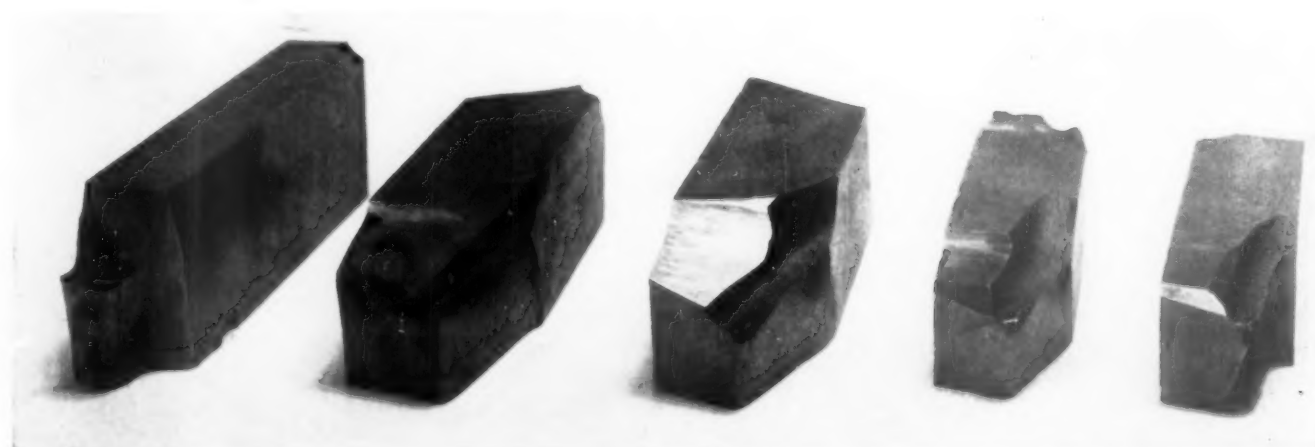
A hand ground tool which required sharpening after turning 13 gears of AMS 6250, cut 200 to 500 gears of the same material when sharpened by the new method. A cutting tool that had turned 30 shafts of the same grade steel for each hand ground edge turned out 200 to 300 pieces when sharp-

ened by the Wright developed system. Other comparisons in the lives of hand ground and machine ground tools are shown in an accompanying table.

These tools should dissipate fear of reduced production through the use of moly steels for the greater number of cutting tools used in war work. Wright engineers point out that their experience has shown that some moly steels give better results comparable to tungsten or cobalt high speed steels when properly applied. Strangely enough, some molybdenum steels have proved superior on individual applications. The answer may be found in precision machine-grinding and honing cutting tools.

Development of the new method started in a study of the machinability of various metals. As a preliminary to such tests a research was made to develop a satisfactory tool design for the average rough machining of higher alloy steels. Several designs with and without chip breakers were tried. Because of the difficulty in producing

**Study at Wright has shown that almost every operator varies the surface and pitch in hand grinding tools for the same operation. This is a typical group of such tools for one rough turning job. Control of tool angles can only be obtained through centralized tool crib control.**



economically without special set-ups for chip breaker grinding, or heat generated at the cutting edge when a chip breaker was not used, many designs were discarded.

Eventually, a standard single point cutting tool which eliminated numerous designs then in use for various rough turning operations was produced. It will be described later. Through continued effort, a production method of machine grinding was worked out.

At the same time tests were being conducted at Wright to determine which of the many brands of moly high speed steels available gave the best performance in comparison with tungsten or cobalt alloys. Because it was essential that uniform tools be used in such tests the two projects logically were merged into one.

### Standard Design

Following is a description of the tool eventually adopted as a standard design in this research work, and now used for many rough turning operations in the airplane engine shops: 13 degree side rake, 5 degree back rake, 6 degree front and side clearance, 1/6 inch nose radius, and a step-type chip breaker design adaptable to the application. The chip breaker was ground to the same positive rakes to deflect chips from the cutting edge of the tool. The breaker has a depth of 1/16 inch and has a 1/16 inch shoulder radius of all sizes. The width and angle of the chip breaker is dependent on such factors as surface speed, feed, depth of the cut, and the material. Generally, the width of the chip breaker at the nose end varies from 7/32 inch on a one inch square bit to 3/16 inch on a 3/4 inch square tool, and 5/32 inch on a 5/8 inch tool.

These dimensions were adopted on the basis of exhaustive tests.

Life and performance of tools are greatly affected by the grinding finish given them. This is proven in the accompanying table which shows the number of pieces obtained per tool grind with hand ground tools and with machine ground and polished tools.

Behind these startling figures lies the secret of this new method of handling cutting tools. Keenness of the cutting edge and smoothness of the end, flank and chip breaker groove of the tool provide the answer. Under the microscope, the cutting edge of any

## PRODUCTION TESTS ON TOOL STEELS

### MOLYBDENUM H. S. STEELS vs. COBALT H. S. STEELS

• Tests made on rough machining 13 representative forgings of the following materials: AMS 6250, AMS 6290, AMS 6332 and AMS 6470.

Tests are based on machining over 61,000 pieces on the 13 representative forgings. The tools were tried on over forty different forgings or more than 100,000 pieces in all but insufficient data was obtained on some of these. The thirteen representative parts gave the most varied conditions as to feed, speed, depth of cut, and materials.

The tests to date have given the following Molybdenum high speed steels as optional substitutes for cobalt high speed steel on turning operations: Brand No. 2, No. 3, No. 4 and No. 5.

On some applications, Molybdenum steels have excellent cobalt steels.

For purposes of comparison, the cobalt steel designated Brand No. 1 has been given the rating of 100%.

All tools used on this test were machine ground and honed to the same degree of surface finish.

### AVERAGE TOOL BRAND COMPARISON

TOOL BRAND	TOTAL No. OF PCS. MACH.	TOTAL No. OF TOOLS USED	AV. No. OF PCS. PER TOOL	PER CENT RATING
1	8723	46	189	100
2	5138	30	171.3	91
3	5333	33	161.6	86
4	3283	21	156.3	83
5	4859	31	156.7	83
6	4141	32	145.0	77
7	2612	21	124.4	70
8	4337	35	123.9	70
9	3441	31	111.0	59
10	3220	29	111.0	59
11	3574	33	108.3	57
12	3243	33	98.27	52
13	1990	22	90.5	48
14	2936	37	79.4	42
15	1102	4	275.0	*
16	925	9	102.8	*
17	758	12	63.2	*

\*The small number of tools tested to date prevents a fair comparison of tool life on these. (September, 1942).

tool takes on the appearance of irregular saw teeth. The roughness varies according to the abrasive wheel used and the care exercised in grinding. Figures 1, 2 and 3 which show micro-photograph of the cutting edges of tools, illustrate this fact.

The especially rough cutting edge shown in the first of this series of microphotographs produces an uneven flow of metal through the crevices at the edge of the tool, and creates localized high stress concentration. The heat that develops at the point of

the tool as a result of this uneven flow naturally increases breakdown of the tool steel and results in rapid wear. The resistance to chip flow with ordinary hand ground tools produces more built-up edge on the tool and results in rougher machined surfaces. This very condition, the cutting tool experts at Wright point out, is the chief reason for tool wear.

Honing the cutting edge and end was their answer. The last of a series of micro-photographs shown illustrates the super-finish achieved with the

rapid, inexpensive grinding and honing methods developed. In producing the surface shown, a 10x2x2 inch Alundum vitrified wheel (Norton 38220-L9BE or comparable) was used. The finishing was done dry on an Ex-Cell-O grinder. About one minute was required for the operation. The wheel was found easy to use and does not burn as readily as some others tested. Though it is not difficult to obtain a smoothness of 1.0 to 1.5 micro-inches with this 220-grit wheel, a finish of 3.0 to 3.5 micro-inches r. m.s. is acceptable for the job. Honing time was reduced by grinding the upper half of the tool flank and end. This procedure brings this portion of the clearance angle back to six degrees.

Chip breakers are ground with a positive rake, then polished dry. A fine silicon carbide wheel is used to finish to 2.0 to 2.5 micro-inches. The tools are held one at a time for this part of the sharpening operation. A magnetic universal vise is used on a surface grinder. A small amount of stock is removed in polishing and care is exer-

#### COMPARISON BETWEEN HAND GRINDING AND SUPERFINISH MACHINE GRINDING

PART	MATERIAL AMS No.	PIECES PER GRIND WITH HAND GROUND TOOL	PIECES PER GRIND WITH SUPER-FINISH TOOLS
Gear	6250	13	200 to 500
Gear	6250	30	400
Ring	6250	100	150 to 290
Shaft	6250	30	200 to 319
Gear	6250	10	44 to 162
Gear	6250	15	40 to 102
Ring	6250	20	50 to 117
Shaft	6254	15	103 to 200
Gear	6250	18	111
Shaft	6254	8	40
Shaft	6254	8	50
Adapter	6250	1	28

cised to avoid burning or chatter marks.

In rough grinding the chip breaker groove, a 7x $\frac{1}{2}$ x1 $\frac{1}{4}$  inch Alundum wheel is used (Norton 3846-18BE or comparable). The shoulder radius of 1/16 inch is carefully formed by gen-

erating the radius on the edge of the wheel. For polishing or honing the chip breaker groove, a 7x $\frac{1}{2}$ x1 $\frac{1}{4}$  inch Crustolon silicon carbide wheel (Norton 37320-J8L or comparable) is used. This wheel removes rough grinding marks. Burr on the cutting edge is then removed by a touch of hand stoning.

Tools are semi-finished ground wet on the flank and end, one at a time, in an Oliver grinder with a specially formed cam or guide which permits the radius and both clearance angles to be ground simultaneously. The wheel used for this work is a 7x $\frac{1}{2}$ x1 $\frac{1}{4}$  inch Alundum vitrified (Norton 3486-L5BE or comparable).

In the preparation of form tools, the new Bura-Way grinder plays an important part in carrying this method of tool finishing into that class of cutters.

Success of the project has permitted this concern to act on the knowledge that a reduction in the number of tool shapes in a shop is advantageous. Since the fewer tools the better, Wright engineers are striving to hold the number for all their rough work to a dozen.

No appreciable difference in the effect of various coolants has been found with these tools, and oil reclaimed and tested is now used regularly. A sulphur base oil has given the best performance on carbide tools.

Since the project was started last year, more than 100,000 forgings of 40 different shapes have been machined using this new tool finishing meth-

THE TOOL ENGINEER

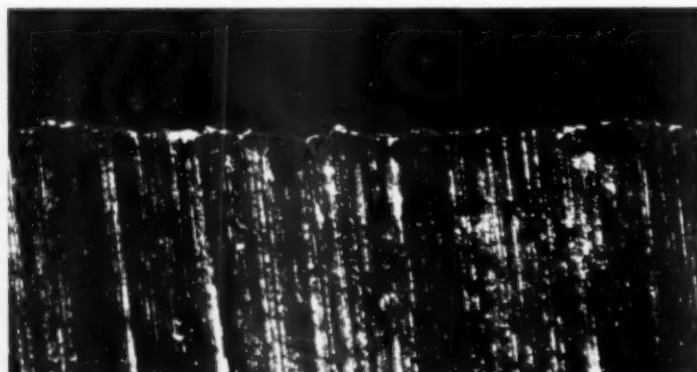


Figure 1. Enlargement of the cutting edge of a tool hand ground by a good operator at Wright shows the relative roughness of surface obtained. Finish: 20-25 micro-inches r. m. s. (Magnification 100X).

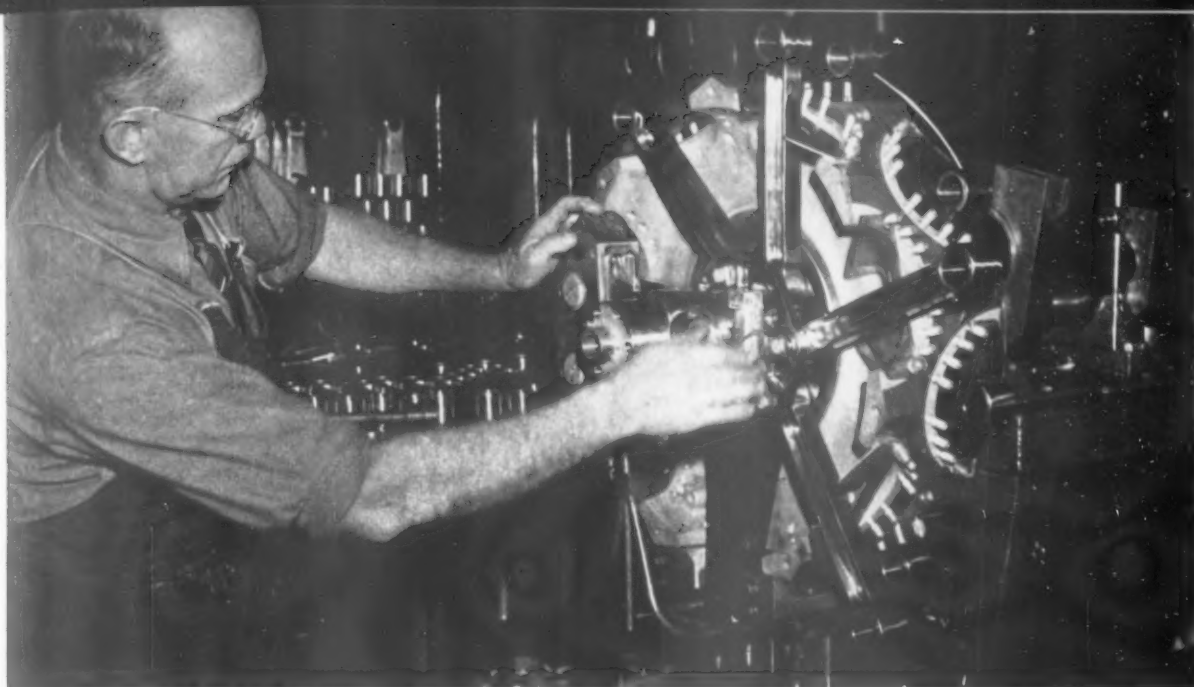


Figure 2. Improvement is shown in this enlargement of the cutting edge of a tool semi-finish ground, but before honing by Wright Aeronautical. (Magnification 100 X).



Figure 3. This is the cutting edge of a machine ground tool carefully honed by Wright to step-up tool life many times. Finish: 1-1.5 micro-inches. (Magnification 100 X).





Photographic study of connecting rods on radial engine.

## PRECISION MASS PRODUCTION

### THE HISTORY OF WRIGHT AERONAUTICAL

● Precision manufacture in quantity was early achieved by airplane engine builders. The same industry led the way in real mass production precision manufacture. The Wright Aeronautical Corporation, whose Tool Engineers discovered and developed the revolutionary grinding methods for cutting tools described in these pages, has played an important role in the story of quantity output of radial engines built to minute tolerances.

The history of Wright, which has witnessed a phenomenal growth since the advent of America's struggle for military air superiority, comprises a significant chapter in the history of aircraft engine manufacture.

The company was founded in 1909, by the men who gave the world wings—the Wright Brothers. In 1915, the Wrights joined forces with another pioneer airman, Glenn L. Martin, to form the Wright-Martin Company. After yeoman service in building V-type liquid-cooled Hispano Suiza power plants for World War One fighting planes, Martin left the organization and it was renamed the Wright Aeronautical Corporation.

Then in 1929, a great aircraft building group, Curtiss, consolidated with Wright to form the Curtiss Wright Corporation. The Wright Aeronautical Corporation is the engine building division of this concern. Sole products of this concern today are aircooled, radial engines ranging from nine cylinder,

300 horsepower units to 18 cylinder, 2,000 horsepower engines.

Each of these monster power plants is the product of pure production genius. One engine contains more than 8,000 separate pieces, involves 80,000 machining operations and requires 50,000 inspection operations before it is ready for installation in a Douglas B-19 Heavy Bomber or a Martin Patrol Bomber. Tremendous as they are, they weigh only a fraction over one pound per horsepower.

Wright built the first commercially used air cooled engine in 1923, a Whirlwind rated at 200 horsepower. Production of the Cyclone engine, at first a nine cylinder, 525 horsepower unit, was started in 1925. The same size engine now produces 1,200 horsepower. Five years ago witnessed the introduction of a 14 cylinder job which turned out 1,500 horsepower, and two years ago the giant 18-cylinder, 2,000 horsepower engine was put in production.

Simultaneous with its development of finer power plants, the concern has expanded. Then a small company, Wright moved to Paterson, New Jersey, in 1920. There it occupied three floors of a single wing of a building which has been multiplied many times over in area not only in Paterson but in a big mid-western city as well. Wright workers, who numbered a few hundred two decades ago, may now be counted in the tens of thousands.

ed on about 20 different brands of high speed tool steel. No change in product on set-up or routine was permitted. Both automatic and hand turret lathes were used on various rough turning operations.

Tools were set on the center to the axis of work and at 90 degrees to the

cut. Experience showed that tool life is greatly reduced by not keeping tools up on center to the axis of the work. As tools were reground, they were brought back to center by shimming up. Modifications of the holder designs are planned to take care of this factor on turret tool holders where this

is not always possible.

In these long tests, other interesting facts were revealed. For example, there is a marked reduction in power consumption when the cutting angles are properly formed. An increase in the side rake angle produces a decrease in power consumption, but like-



Each of these 2,000 horsepower radial engines turned out by Wright Aeronautical is a masterpiece in precision mass production. One engine contains some 8,000 separate pieces, involves 80,000 machining operations.

Radial engine part machined with Wright finished tools of 8 per cent molybdenum H.S.S. The forging, of AMS 6250 or SAE 3312 (Brinell 196-286 normalized) was rough turned on the o.d. of the neck from the flange to the end of the neck. Run at 42 r.p.m. (57.3 feet per minute surface speed) 0.009 inches per rev. feed. Depth of cut  $\frac{1}{2}$  inch; length  $2 \frac{5}{32}$  inches.

Specially finished tools shown produced 400 to 600 pieces per grind, removing more than three pounds per piece. Hand ground super H.S.S. (8 per cent cobalt) tools produced only 30 pieces per grind. Short chips in the foreground show the effective work of the chip breaker which lowers operating temperature and facilitates scrap removal.



wise decreases tool life. A thin-edged tool (With small included angle) cuts more easily, and generates less friction than a thick-edged tool. However, the cutting edge must be heavy enough to work satisfactorily at reasonable surface speeds and feeds. For average ferrous machining jobs, a 13 degree side rake angle proved most suitable.

Tool steel can be saved in many instances by using a smaller tool bit. Numerous tests showed a  $\frac{3}{4}$  inch tool bit, for example, produced more pieces per grind than a one inch bit previously hand ground. The natural deduction is that a one inch tool bit when machine ground and honed will give still greater tool life. As a definite tool change period for each operation can be established to avoid complete tool breakdown, bits require little grinding to restore them to top condition. Economy of material and grinding time results.



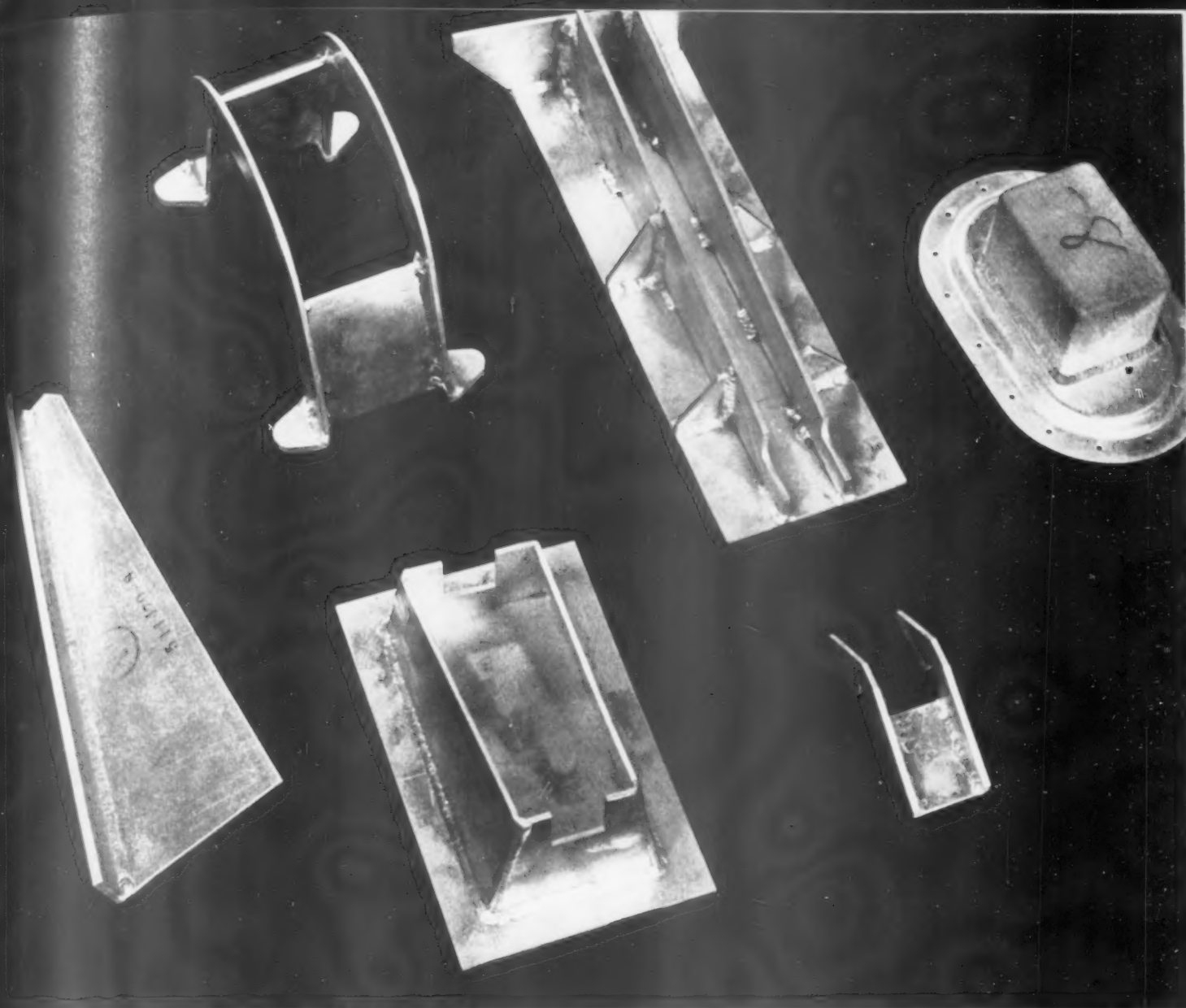
Wright engines power such planes as the Navy's famous Grumman "Avenger".

An economy is effected in costly grinding wheels too, due to less frequent use. By setting up a tool grinding room instead of using operator grinding, wheels can be kept in the best possible condition. This way, grinding stands throughout the shop are eliminated and production of standard tools at a lower cost is possible.

Thousands of machining operations on big radial engines have given Wright Aeronautical engineers an unusual opportunity to study the problems of cutting tools. They point out that extreme importance should be attached to the handling of tools after they have been sharpened. The cutting edges of the tools must be protected against possible damage. They should be carefully inspected, then wrapped in Scotch tape or paper and stored in centralized cribs until ready for installation in machines.

THE END

THE TOOL ENGINEER



A variety of Heliarc-welded airplane parts.

Northrop Photos

# HELIARC WELDING

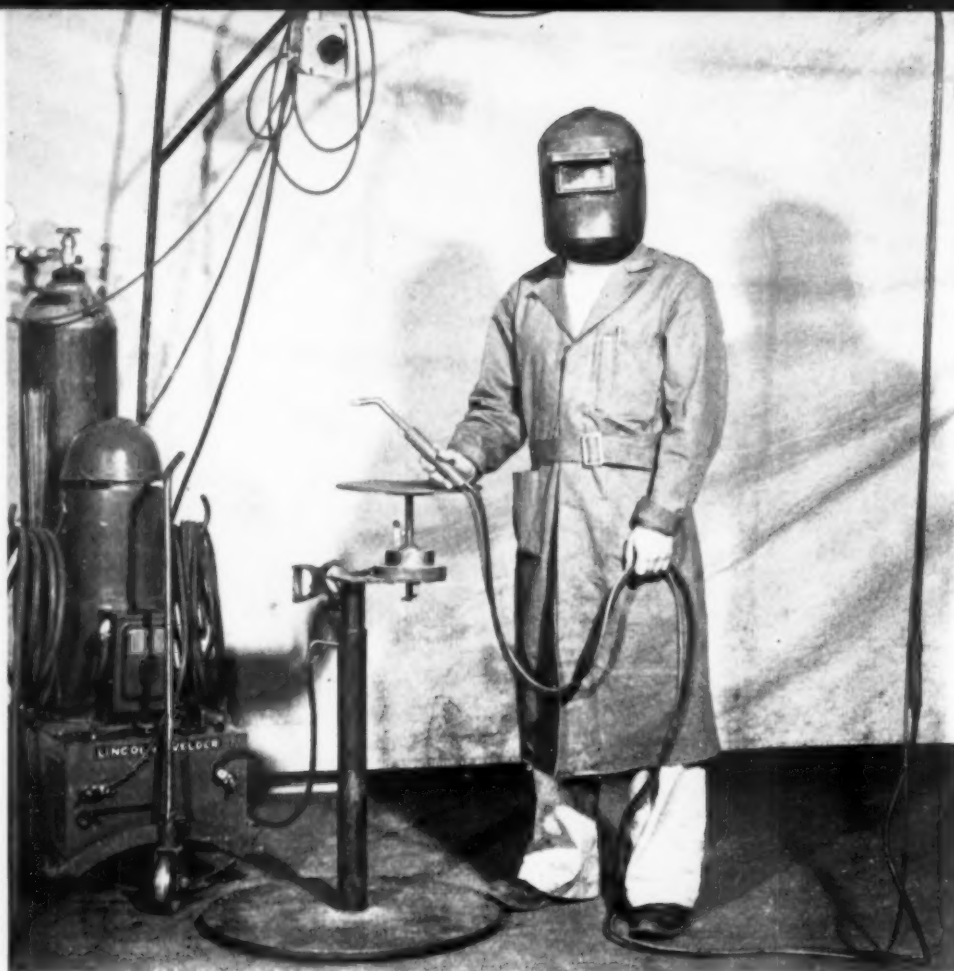
Development of a simple tool and new methods of welding make available for war production a new material which lies in inexhaustible quantities at the nation's shore line. The material is magnesium, and the tool is the Heliarc welding torch introduced recently by Northrop Aircraft Inc. engineers. Two years of research underlies the achievement.

JAMES BOWLES

**S**IMPLIFIED methods leading to increased plane output are the goal of all manufacturers for war. Use of magnesium promises a greatly increased production for the future, though that time cannot be stated with any degree of accuracy. In fact, to do so would serve no good purpose, and would only help give the enemy an estimate of the growing strength of the United States' air power.

In reviewing the development, Thomas E. Piper, Northrop process engineer, points out that Heliarc welding is so important that it would prove to be a tangible weapon in helping to defeat the Axis. It is understood the process will be made available to





Heliarc welding. Note grooved backup strip for light gauge sheet and angle of the filler rod to the arc.

the aircraft industry generally.

Several difficulties in aircraft construction and operation led to the Heliarc project. Not only will use of magnesium ease the demand for duralumin, but the rivetless construction also will ease the engine's load to a marked degree. Rivet head on both fuselage and wings, even when countersunk, produce parasite resistance, and cut the plane's speed. At high speeds, a substantial part of the engine's power is used to overcome this resistance. Now Mr. Piper sees airplanes coming which will be finished as smoothly as a fine automobile, presenting to the airflow a uniform and rigid surface.

### The New Torch

In discussing the new torch, it is important first to explain that, with this process, a shield of helium gas surrounds the molten metal. Helium being an inert gas, oxidation is prevented, use of a flux is made unnecessary, and the danger of entrapped flux in the weld (which would promote corrosion) is eliminated. Too, the arc is struck directly between a tungsten electrode, which is used with reverse polarity, and the base metal, which

becomes the anode, and not between two tungsten electrodes as in atomic hydrogen welding.

The torch, as noted in the accompanying drawing, (C) carries a helium valve which is opened immediately prior to striking the arc. Helium is fed through the torch to the weld. As for details of the operation, Mr. Piper explains:

"Helium has over five times the specific heat of air and, when in motion, prevents heat accumulation around the weld, thereby keeping it cooler and giving a better fusion and penetration with less distortion than other welding processes. The arc is struck by a light brushing action and quickly drawn back from the metal. The torches are of two sizes to handle 1/16" to 1/8" electrodes and 3/16" to 1/4" electrodes respectively, with tips of 40°, 60°, and 90° angles. The torch may be used for pencil welding or, by extending the handle, a handle bar grip is obtained for heavier welding.

"A type of torch will later be available that feeds the filler rod automatically, giving more uniform results than where the rod is fed by hand. Best results are obtained by feeding the filler rod into the tungsten

electrode which melts off portions of the rod thereby casting a uniform weld ingot. This procedure has been found to be superior to the practice of feeding the filler rod into the molten pool under the arc, whereby the molten pool is not sufficiently agitated to break the crust which gathers on the surface of the pool.

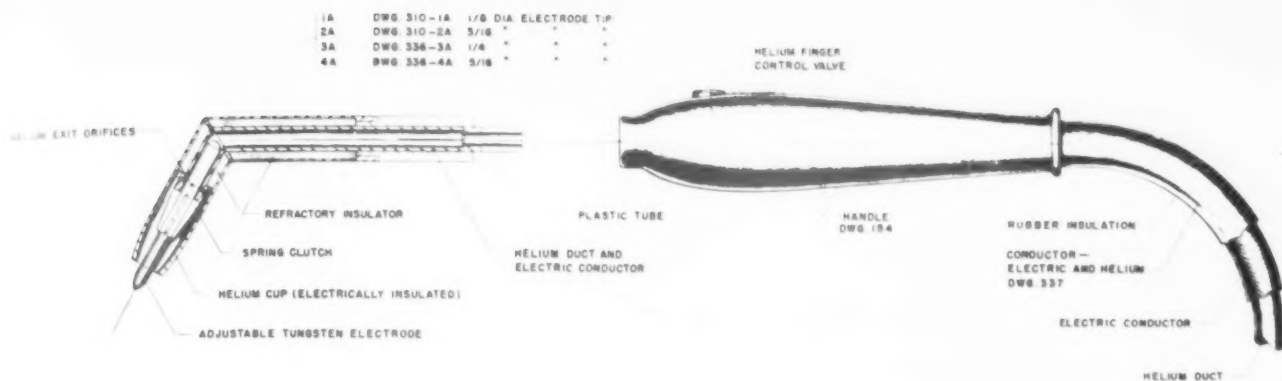
"Since the reflected heat from the tungsten overheats the filler rod, an angle of 60 to 90 degrees must be maintained between the filler rod and the electrode. The tungsten electrode varies in size from 1/16" to 1/4", depending upon the thickness of metal welded and the heat required.

"The torch must be held as near the weld as possible to obtain maximum benefit from the helium for the prevention of oxidation. Also an arc length of 0.060" maximum should be maintained. Poor penetration or gas holes may result by using too long an arc. On those alloys that have a tendency to be hot short, a rapid welding speed is recommended, approximately three feet per minute, to eliminate the danger of cracking.

### Direct Current Generator

"A conventional arc welding machine with direct current generator having a 150 ampere output is desirable. However, higher output machines which operate at less than 300 amperes may be used providing lower amperes may be obtained. An upright machine is preferable in that it is easier to attach a helium tank to such a unit. Separate amperage and voltage regulators must be provided and the machines should have a continuous sequence of five increments of current control. The average life of a 200 cu. ft. helium tank is about 35 hours of continuous welding with a medium-sized torch.

"Fairly pure helium gas is required. Normally helium as purchased from the Government plant is sufficiently pure to cause no difficulty. Additional gases in helium such as carbon dioxide, hydrogen, nitrogen and the the hy-



Drawing of the Northrop Heliarc Welding Torch and a diagram showing the Heliarc welding circuit.

drocarbons may cause pronounced defects. Hydrogen produces bad porosity. Oxygen films the metal causing poor coalescence and inclusions. The presence of 7% nitrogen in the helium reduces the welding speed to about two-thirds that obtained when only 2% is present. All of these gases if present, may be removed, however, by passing the helium through filtering mediums."

It is a common opinion among laymen that magnesium alloys are highly inflammable. This is only partly true. When properly processed, they become more resistant to flame than aluminum alloys. Too, whereas magnesium alloys are a third lighter than aluminum alloys and only one-fifth (21 per cent) the weight of steel per unit volume, their weight-strength ratio is comparable to aluminum alloys. "Important, too," remarks Mr. Piper, "is the fact that magnesium alloys possess the design property of stiffness and rigidity that cannot be

employed in other alloys."

Already, within the experience at Northrop, it has been found that magnesium castings containing foundry defects have been repaired with this process, and welds equal to or stronger than surrounding metal have been obtained. In these cases, the weld metal is much denser than the surrounding cast metal, and far less liable to corrode. Nearly any thickness of cast metal that can be poured may be welded readily with this process.

Usually, a welding rod of the same alloy as the parent metal is used for castings and wrought alloys. In salt spray tests, the weld ingot appears to have better corrosion-resistant prop-

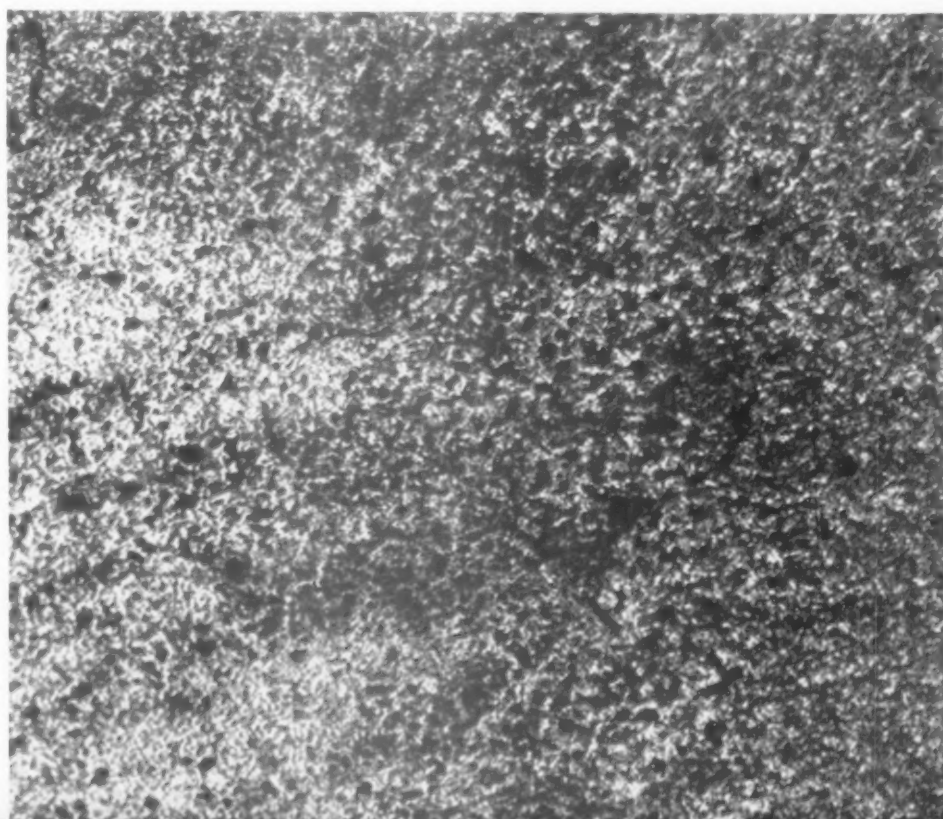
erties than the parent metal. Also the weld bead appears to be cathodic to the adjoining metal, which causes minor pitting of the original metal adjacent to the weld under severe corroding conditions.

In working the material, explains Mr. Piper, "the tungsten electrode is very slowly alloyed with the weld metal and naturally in a period of time the tungsten electrode must be replaced. No noticeable increase in the corrosion rate of heliarc welds in magnesium alloys because of the presence of tungsten has been noticed.

"Heliarc weld ingots have in general an extremely fine grain with practically no grain enlargement adjacent

**Microphotograph of grain structure of weld. Magnification is 500X. Acetic acid etch showing weld fusion or blending characteristics of weld ingot with parent metal.**

**Weld ingot (darker half of print) made of Dowmetal "J" alloy rod blended with Dowmetal "J" parent metal (lighter half of print).**



to the bead, indicating that there is a minimum of heating effects on the adjacent metal. This accounts for the very good weld efficiencies obtained on heliarc welded alloys.

"Dowmetal J-IH magnesium alloy, heliarc welded, has approximately 95% of the parent metal strength in the weld area. However, at present the design safety factor for welded dowmetal—IH assemblies is 75% of the strength of the parent metal. These strength values are based on butt welded joints. Fillet, lap, edge, or corner welds are weaker than the butt welded joint and must be stressed accordingly.

"Heliarc welding has proven to be a successful medium of attachment for magnesium, stainless steel, brass, inconel, monel and some of the carbon steel alloys. Research work is now in progress to extend its use to aluminum and other carbon steel alloys not heretofore heliarc welded."

#### Abundance of Magnesium

Use of magnesium in airplane construction is not new. The metal has been employed for some time in the fabrication of engine parts, wheels and accessories. Difficulties in fabrication that all-magnesium planes have prevented its overall use, however. Such a plane will possess many advantages, at which we have hinted. What is the availability of magnesium, and at what cost can it be processed for application to warplane construction.

First, Mr. Piper reminds us, it is the most abundant metal known, and occurs widely both in the earth and in the sea. Fact is, about one-seventh of the dissolved solid matter in the sea consists of magnesium sulfate and magnesium chloride,—"enough", the

engineer points out, "to cover all the land areas of the earth to a depth of 60 to 70 feet, or the staggering weight of nine billion pounds per cubic mile."

#### Inexpensive

As for availability . . .

"The mother liquors from the brine of salt wells are always rich both in magnesium salts and bromides," Mr. Piper points out. "Nearly all the silicate rocks of the earth's crust contain notable quantities of magnesium. Some of these are of commercial importance; examples are talc, soapstone, and asbestos, cement and marble. The cost of magnesium alloys at the present time is greater than aluminum alloys. However, because of new magnesium plants under construction and increased production in the plants now in operation, magnesium alloys will be cheaper than aluminum alloys in a very short time. Twenty-four thousand kilowatt hours are required to produce a ton of aluminum from Bauxite and only 18,300 kilowatt hours are required to produce a ton of magnesium, which has 54% more volume. Magnesium alloy will shortly be the most plentiful alloy if it is not at the present time. The World's largest deposits of Brusite, a magnesium bearing ore are in Montana, Washington and British Columbia."

#### Welding Stainless Steel

Some interesting possibilities already are being envisioned by engineers. Whereas the new welding method provides an important new tool for fabrication of structures from magnesium and stainless steel alloys, any type of joint commonly used for welding ferrous metals may be employed

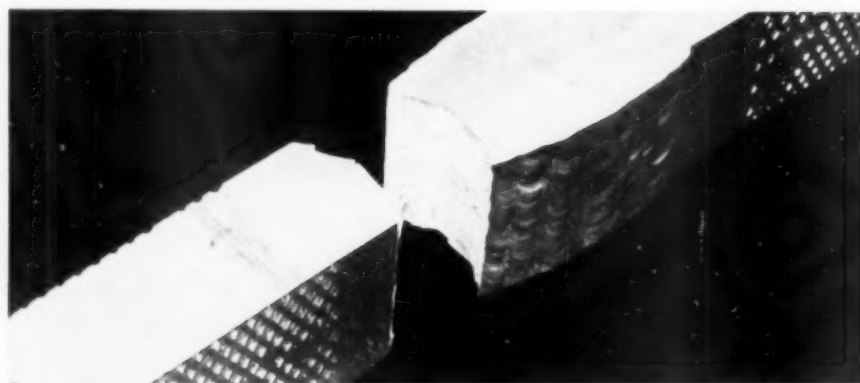


Notice the grooved back-up strip for light gauge sheet and the angle of filler rod to the arc.

#### HELIARC WELDING

- Arc welding of magnesium sheets, extrusions and tubing into structures which are stiffer, simpler and lighter than can be achieved through conventional duralumin construction.
- Through the new method, handling of magnesium without danger of fire.
- Elimination of thousands of rivets used in a conventional warplane.
- Reduction of resistance or drag in the completed structure, with consequent greater speed and operating efficiency.
- Other favorable factors are believed to be possible. These await further developments in the technique of handling materials.

Magnesium Heliarc welded tensile test specimen, illustrating the tendency of magnesium heliarc welds to break in the parent metal adjacent to the weld ingot.



on stainless steel and magnesium. As is widely known, stainless steel has been the most difficult of all alloys to weld. By the new process, stainless steels of thicknesses less than .010" may be welded easily. "In the heliarc welding of stabilized stainless steel," says Mr. Piper, "the extent of carbide precipitation is very low as compared to other methods of welding, which greatly increases its fatigue factor." He also suggests the medical profession would do well to consider this process for arc welding stainless steel braces in bone surgery where other means of attachment, including spot welding, have not been wholly satisfactory.

THE END

Coming issues of **THE TOOL ENGINEER** will further carry articles on West Coast aircraft plant developments.

**THE TOOL ENGINEER**





Photo by courtesy of Cessna Aircraft Company

## DRILL JIGS for Wooden Airplane Spars

J. W. RIX

**A** GREAT MANY devices have been used in an effort to properly perform the important task of locating and drilling the bolt holes in wooden airplane spars. Smooth, trouble-free assembly of wings cannot be achieved unless this is properly done. High speed production schedule of such work cannot be maintained with any except correctly drilled holes.

The spars are the principal beams of the wings and serve not only to support the airplane in flight but, more important from the manufacturing viewpoint, they serve as the principal tie members to which are attached such important and precision built assemblies as fuselage, motor mounts, ailerons, control pulley brackets, etc.

Obviously, either mislocation or misdirection of the bolt holes in the spar will mean delay or possible distorted mounting of these attached

parts and consequent imperfect functioning of the complete unit.

A new type of airplane spar drilling jigs developed by C. B. Gilmore, of the Cessna Aircraft Company Tool Design Department, has made it possible to produce the drilled holes with an accuracy well within the strictest requirements. The drilling is done quickly and without special care after the work is placed in the jig.

### Accuracy, fine finish

Prime features of the new jigs include provision for releveling to compensate for any shift in the foundation; extreme accuracy in their construction; and provision for drilling each hole part way through from one side and finishing it by starting anew from the opposite side.

Each jig designed by this midwest Tool Engineer has two sets of plates which support long, hardened drill bushings. Each bushing exactly matches its mate on the opposite side of the work. The drill is run into the work until its tip is just past the middle of the spar, then is withdrawn. Any tendency to drift sideways is of no consequence for the opposite end of the hole is later drilled with the drill being guided by an identical bushing on its side of the spar.

This special provision eliminates the splintering of the wood around the holes since the bit never passes through and emerges on the opposite side.

Spars drilled in this manner make assembly of the wings a faster job and result in less time and attention being required to properly align the wings, engineers who have used it report.

THE END.

How Great Britain Uses

# Tungsten Carbide in Wire Manufacture

Concentration on Supply of Rough Dies  
Speeds Production Methods

BY ERIC N. SIMONS\*

**D**RAWING wire through a tapered hole in a die or draw-plate is more than 2,000 years old.

Nevertheless, not until the fourteenth century was the draw-plate generally used. A laborer, usually outstanding in physical strength and size, and particularly in girth, wound the material round his waist, fastened it, and pulled it through the draw-plate by main force.

By modern machine wire drawing methods, wire can be produced in diameters up to .072 inches at a speed of 6,000 feet a minute. For larger diameters of wire, of course, this speed must be reduced. From stock, as many as sixteen reductions can be made.

\*Well-known authority on the British steel industry; joint author of "The Structure of Steel" and "Steel Manufacture"; member of British Trade Delegation to U.S.S.R. in 1929; has frequently visited the United States.

A feature of modern British wire-drawing practice is the adoption of tungsten carbide pellets. These have been supplied for some time by tungsten carbide manufacturers ready mounted in their casings, but to speed up production a method has been designed whereby the rough dies them-

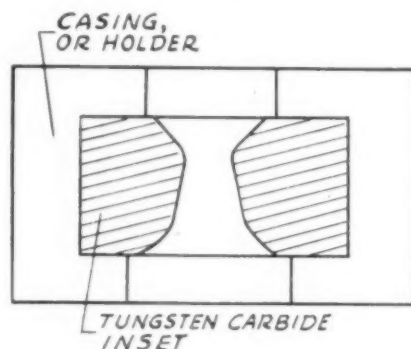


Figure 1, How pellets are mounted.

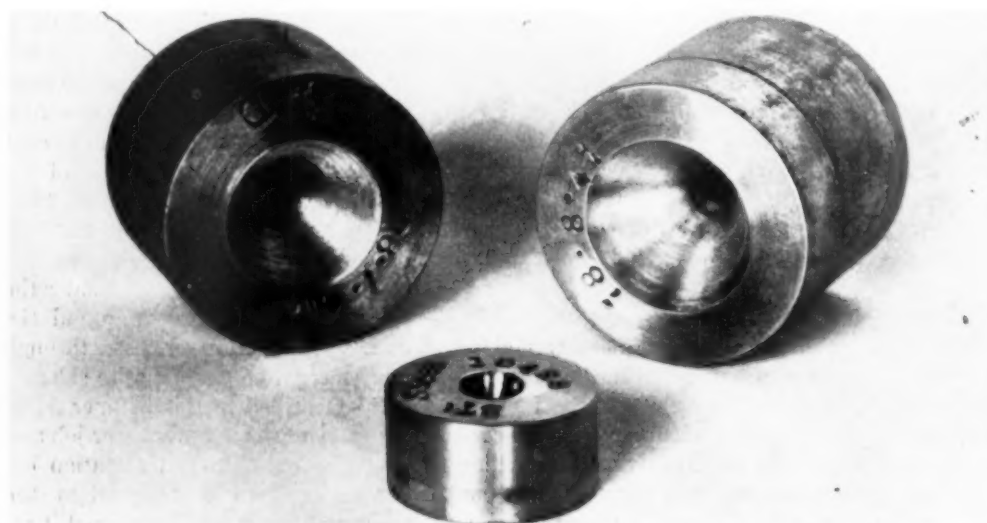


Photo by courtesy of British Information Services  
Tungsten carbide wire-drawing dies.

selves (i. e. the carbide pellets) are supplied, to be opened out and finish ground by the customer to his own requirements.

Most wire drawers have a maintenance department, where worn dies are opened out to the next size larger. This is a continuous process, and is carried on until in the end the die is completely worn out and has to be scrapped. These facilities are now used to finish rough tungsten carbide dies.

Die manufacturing efforts are concentrated on the production of rough pierced tungsten carbide pellets, with a minimum of oversize stock to be removed by the finish grinding and polishing operation in the customer's shop. The carbide manufacturer sup-

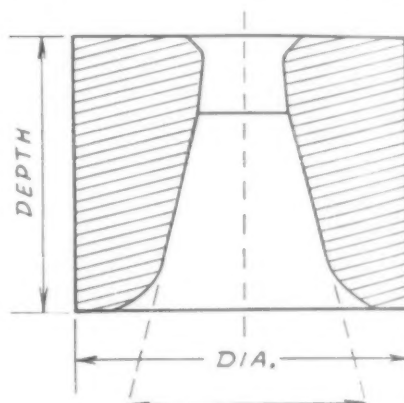


Figure 2, Rough pierced pellets.

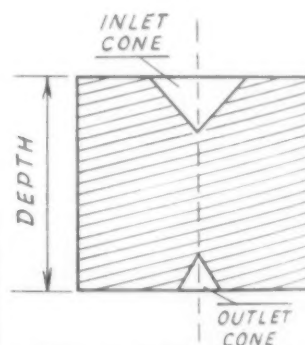


Figure 3, Rough centered pellet.

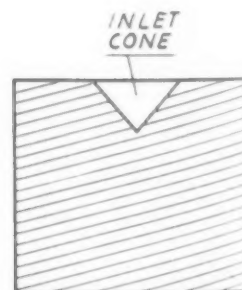
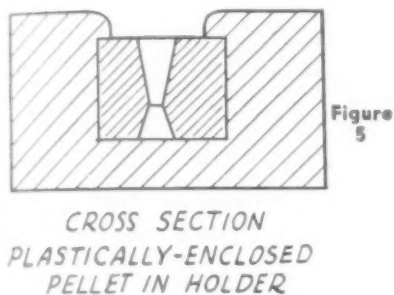
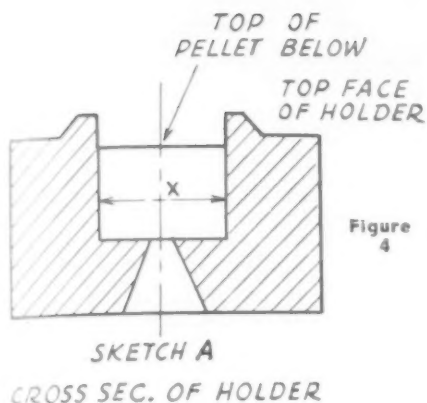


Figure 3a, Rough centered pellet.

THE TOOL ENGINEER



plies the rough pierced tungsten carbide pellets to the user's specification as regards dimensions of inlet angle and so on. The amount of stock left in any particular hole depends to a certain extent on the size of the finished hole. Users generally specify the size they will finish to, e. g. "to finish to 0.060 in."

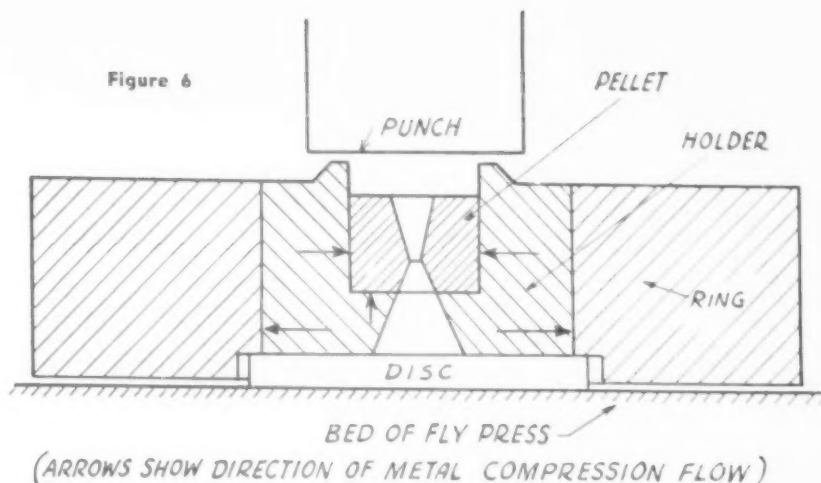
The standard sizes in which the British carbide pellets are supplied are given below, but other sizes are made if required.

#### CARBIDE PELLET DIMENSIONS

Diameter	Length
9 mm.	6 mm.
9 "	9 "
13 "	11 "
15 "	13 "
17 "	15 "
20 "	20 "
27 "	21.5 "
32 "	30 "

A rough sketch indicating the type of rough piercing or centering desired is sent when ordering. For centered pellets, it is usual to specify the diameter and depth of cone, as shown in the sketch, and to state whether inlet and outlet cones are desired, or only an inlet.

For rough pierced pellets, it is preferable to send a detailed sketch of the finish polished die so that this can be moulded to leave the minimum amount



of material for removal in polishing. If this sketch cannot for any reason be sent, the finished diameter of the die and the angle of inlet should be stated.

#### Mounting Pellets

An indication of whether the material is to be drawn wet or dry and the nature of the lubricant used proves helpful.

The method of enclosing or mounting the pellets in the casings or holders is known as "plastic enclosure". To carry it out, a piece of mild steel bar is taken of a suitable oversize diameter, and this is finish machined to sketch A on Figure 4. The outside diameter of the holder should, of course, be left slightly full to size for a later finishing operation to ensure perfect concentricity. The bore X is left slightly small to size so that the pellet is an easy fit in it when red hot, and in this connection it must be remembered that the later heating operation of a holder will cause expansion of the hole. The holder is then heated to about 1000 to 1100 degrees C.

(1832-2012 deg. F.) and the pellet slipped into the bore.

The holder, with the pellet inserted is then slipped into a die, as shown on Figure 5, and the whole assembly is placed under a fly press with a suitable punch mounted in the ram. The screw is then brought down two or three times smartly by hand operation, resulting in the die's being neatly closed over, as illustrated.

The squeezing action also results in the metal round the pellet being squeezed in, as the outside diameter of the holder cannot expand owing to the ring restraining it. This results in the plastic enclosure of the pellet in the mild steel bar.

For small dies, brass, bronze, or any of the non-ferrous alloys usually employed may be substituted for the mild steel holders. The treatment is exactly the same, with the exception of the temperature.

The housing is then finish-machined, keeping the hole dead concentric. Finally, the bore is ground and polished to the finish size. THE END.

#### CARBIDE DRAWING DIES IN THE UNITED STATES

• Cemented carbide wire drawing dies are standard tools of the American wire industry today according to James R. Longwell, Chief Engineer, Carboloy Co. Inc. Increased use for such dies has developed in steel mills as well as in plants working brass and aluminum, he points out. Applications of special carbide dies to mass production of close tolerance parts are growing. Steel dies for this type of work are prohibitive because of the number of dies required on large production. Though cemented carbide nibs must be scrapped when over-size, their long life reduces cost materially.



# Steel Casting Design:

## ITS RELATION TO PRACTICABILITY, QUALITY AND COST

L. E. EVERETT

KAUKAUNA MACHINE COMPANY  
KAUKAUNA, WISCONSIN

CONSIDERING design as an arrangement of form or shape and material to accomplish a specific purpose, a good casting design must be correct mechanically, mathematically, structurally, chemically, economically and metallurgically.

Such features of casting design as section relationships, junctions and fillets have been extensively covered before. But a general summary of these basic principles may prove helpful to further study. Any tentative design will be improved by attending to the greatest possible uniformity of sections, properly filleted section junctions, avoidance of isolated or localized heavy sections, and of design features that cause stress concentrations, such as closed stress systems.

In thinking of design in relation to quality and cost, it is evident that the economics of a given design must be of great importance. After all, the true efficiency of the application is an integral part of the design. We may believe that any design can be cast successfully, but to be economically sound it must be in accordance with the recognized good practices mentioned above.

### Poor Design

The products of the foundry today have outstanding resistance to service stresses of many types. Tension, compression, torsion, fatigue, deflection, erosion, abrasion and impact, and high temperature creep resistance are met under conditions of intermittent or constant loading or any combinations of these, at elevated or sub-zero temperatures.

Compositions featuring ductility, toughness, strength, machinability, cold working properties, hardness, density, weld ability, conductivity, magnetic permeability or retentivity, make castings capable of almost universal application. But, the metals

utilized for castings today are so capable and cover such a versatile field that these factors in themselves may lead to poor design.

The peculiar excellence, or quality of any casting is fundamentally dependent upon the design being metallurgically correct. It seems that failures of castings, due to design, almost entirely are due to the failure of the designers to appreciate the manner in which the casting solidifies in the mold and the solidification and contraction phenomena that occur in casting processing.

Castings, of varying sections, with resulting differences in cooling and solidification rates are not truly homogeneous entities. However the "spread" in physical properties from one section or location to another is probably considerably less in the case of a sound casting, than in the case

of a heavy forging or rolled section if tested parallel to or across the direction of flow of the material when rolled or forged. Designers that accept or utilize specification or hand book values for incorporation in a cast part of metallurgically unsound design are merely "riding on the factor of safety".

On the other hand, the design values normally used for castings are in many cases unnecessarily conservative, and only serve to increase dead weights, if the design of the structure can be economically produced metallurgically sound. This is particularly true of our "low alloy" and heat treated steel castings. Test results, and service tests normally indicate stress resistance far in excess of design values. Expecting the foundry to employ expensive practices to compensate for poor design features is not fundamentally sound practice.

### Costs Considered

For a definition of COST we have accepted, "the expenditure required to accomplish the designers purpose", and we will consider cost to be the cost and value of the piece in its final assembly and not necessarily the cost of the rough casting at the door of the foundry. This restriction is made because we believe the designer should be keenly aware of the ultimate cost of his structure and the ultimate cost may be a major factor in determining whether a given structure should be made as a casting, forging, welding, or be otherwise fabricated. Factors such as machining cost, assembly cost, general serviceability, and facility of repair should be considered.

There are many features of casting design that greatly influence both quality and cost and are to a great degree under the control of the designer. Of these the foremost is the metallurgical correctness of the design which

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From the standpoint of design, the quality of a casting must be "of peculiar excellence" in the following ways:

1. The casting must have the physical strength to resist the stresses to be imposed in service.
  2. It must be of a chemical composition to resist the corrosion or deterioration due to thermal conditions that are expected to be met in service.
  3. The casting must be true to pattern or drawing, that is, of proper size and shape to fulfill the requirements of the designer.
  4. It must be of satisfactory appearance, of sufficient cleanliness, and smoothness to compete with fabricated structures, e.g., it must have sales appeal.
  5. The design must be economically justified, that is, represent minimum cost for the duty required—it must have cost appeal.
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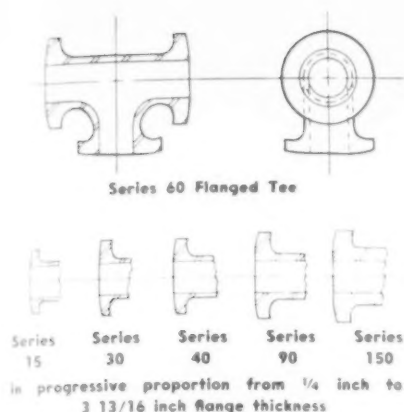


FIGURE 1

is determined primarily by the section relationships, junctions, and other factors previously mentioned. In a great many cases, however, the designer is very much handicapped by the service requirements of the part with the results that a compromise must be reached.

As an illustration we may refer to Figure 1 which shows the typical sections of series 15 to 150 flanged fittings. These have the usual heavy flange attached to the much lighter body. In this case the relative thickness of the sections is determined entirely by the load conditions and the result is that we have a design that violates the commonly accepted requirements for good casting design, and yet is produced in large tonnages satisfactorily.

### Section Uniformity

In discussing design we are prone to emphasize the need for section uniformity unduly. A uniform section, as will be shown later, is not an ideal section to cast where maximum density is required. The most desirable section would be a modified wedge shape that was so arranged that it could be poured and fed from the large end. Solidification would start at the small end and proceed toward the gate and riser.

The foundrymen's plea for section uniformity is due to the fact that he has a much better chance to secure the essential directional solidification by location and arrangement of gates and risers, and control of pouring temperatures and rates when sections are reasonably uniform, and localized or isolated hot spots are eliminated or kept to the minimum.

The functional requirements of the differing sections of a proposed design

## RESTRICTIONS FOR BETTER, SOUNDER CASTINGS, AND SAFER OPERATING CONDITIONS

- ▲ (a) The foundry must be approved by the purchaser, generally after thorough investigation.
- ▲ (b) The use of chaplets and internal chills is generally forbidden.
- ▲ (c) In many cases, both chemical analysis and heat treatment are specified, together with severe physical requirements. The foundry has no latitude, yet is responsible for results. (Seemingly unfair, this does insure unusually sound metallurgical practices.)
- ▲ (d) One major oil company even specifies the general type of acceptable microstructure. It also requires separately cast test bars taken from blocks varying from one inch to three and one-half inches in thickness, corresponding to the section thickness of the casting involved. Proper allowance is made for the effect of section thickness on the physical properties of the metal as can be seen in the accompanying table. Cognizance is also taken of the deleterious effect of design on solidification and contraction phenomena resulting in somewhat lessened physical properties on test specimens. These properties are not difficult to attain in properly made castings, but failures can readily occur. The figures listed apply to metal containing approximately 5% chromium and 1/2% molybdenum with medium carbon content.
- ▲ (e) Some specifications prohibit all welding; others allow defective areas that do not impair strength to be chipped out and welded; still others limit the size and extent of permissible weld areas. Almost without exception, a stress relieving heat treatment is required for castings that have been welded. Other corrective work is limited to chipping or grinding defective areas. If the remaining metal is not under the specified minimum thickness, the castings are generally acceptable.
- ▲ (f) Surface inspection of pressure castings is unnecessarily close. Small pin holes, slag or sand spots, ordinarily not objectionable, must be investigated, resulting in repair or rejection. Laps, wrinkles and cold shuts are particularly objectionable, as they are easily confused with some types of cracks. Steels ordinarily used for high pressure, high temperature work are prone to crack, hence anything of similar appearance is viewed with extreme suspicion, and may result in rejection of sound castings.
- ▲ (g) Castings that leak under hydrostatic tests are not acceptable, and are not to be repaired.
- ▲ (h) In almost all specifications sample or pilot castings are to be crushed, or cut into sections for examination. Evidence of shrink cavities or other defects call for other castings of the same lot to be tested. If others show similar defects the whole lot is rejected. Provision is also made for micro-etching sections of the castings to show up otherwise undiscernible defects.
- ▲ (i) Physical properties of the metal are frequently determined by test bars. One specification states that test bars be cut from the worst part of the casting.
- ▲ (j) Restrictions on heat treatment (normalizing) call for castings to be loaded only one row or layer high and far enough apart to allow free circulation of air. If more than one melt is represented in the load, they must be of nearly the same analysis.
- ▲ (k) Hydrostatic tests up to five times rated working pressure may be required. Pressure must be held for five minutes while the casting is struck with a hammer. If the number of castings leaking from any type exceeds twenty per cent, the entire lot may be rejected.
- ▲ (l) Radiographic inspection provides for any or all castings to be examined by either gamma-ray or X-ray methods. Defects not permissible and common to two or more castings of any one type may result in rejection of the lot.
- ▲ (m) Each casting must carry the maker's trademark, the metal composition symbol, and the heat number.
- ▲ (n) Most specifications end with a clause to the effect that inspection and compliance with specifications does not relieve the manufacturer of responsibility. Any fittings that give unsatisfactory service because of faulty material or workmanship shall be replaced without cost.

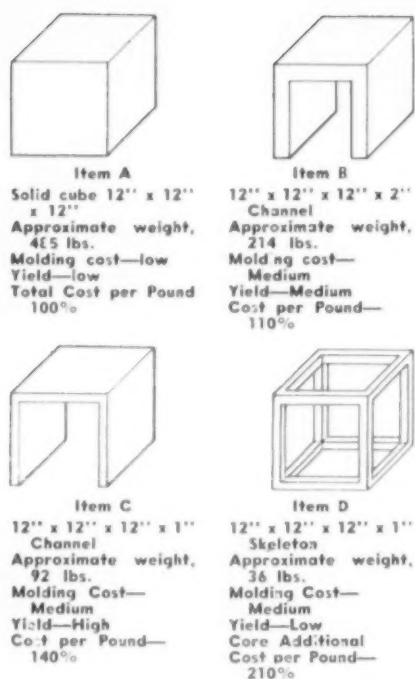


FIGURE 2

may have widely varying and different stresses to resist, and consequently require widely varying sections. It is up to the foundryman to help the designer get the required stress resistance into the design, without making an impossible or economically unsound design.

The compromise between the service requirements to be met and the metallurgical requirements which will permit economical production must be successfully reached. This requires close collaboration between the foundry and the engineer, at an early stage of the design development.

The second and equally important factor the designer has control over is that of specifications and inspection standards. Specifications for a given casting should be determined either by an intimate knowledge of the service requirement in all its phases, or it should be developed by the trial and error method over a period of time and in either case should contain no restrictions not essential to satisfactory performance of the part.

### Specifications for Tests

Specifications for specific tests, such as hydrostatic pressure tests, drop tests, break test, hardness, microscopical or X-ray tests should be correlated with service conditions. The matter of test bars taken from castings or from separately cast coupons should be considered and if test bars are required, due recognition

should be given the "normal solidification factor" of the section from which the test bar is taken. The effect of unavoidable microscopic inclusions on test bar results, particularly those for ductility, should be recognized.

There is a great tendency on the part of some users of castings to impose exceedingly restrictive and unnecessary specifications on the foundry. These frequently constitute items of increased cost to the foundry with no corresponding increase in revenue. This is particularly true in the manufacture of pressure fittings for high temperature work and in Ordnance work.

The major oil companies, and certain departments of the Federal Government, have developed extensive, detailed and seemingly unnecessarily restrictive specifications to cover the manufacture of steel castings. Inspectors have access to all parts of the manufacturer's plant concerned in this production. Many of the provisions seem unjustly severe, when viewed in the light of generally accepted steel foundry practice, but when considered from the standpoint of service requirements and safety, we do not feel that either specifications or inspection standards can be too thorough, if the user will pay for the higher cost.

### Specification Restrictions

Foundry practices must be adapted to suit specification restriction. A part, known as a "safety sleeve", essentially an insertable liner used on the Key 3600 Series of Sectional Type Fittings, is frequently forged or centrifugally cast, it was required of a foundry which did not have centrifugal equipment. Almost irrespective of the method of heading and gating employed, a centerline pipe would develop, normally locating in the critical sections of the casting.

As a result, some leakers were found, under the extreme pressure of the hydrostatic test; 1500 pounds per square inch, and sufficient to actually stretch the casting under the test press. In addition, test bars were cut from castings selected at random, and had to pass the normal specification. Because microscopic imperfections on the surface of a test bar can affect the physical properties, particularly ductility, groups of castings were thrown out because of test bar failure when the material in the castings and the

castings themselves probably were satisfactory.

In order to meet the specification, it was necessary to make chills of the type indicated which had the desired effect of moving the centerline pipe over toward the core to the extent that it no longer was in the critical sections of either the casting or the test bar. A casting economically superior to either the centrifugal casting or the forging, free from test bar troubles, was developed and was available as required in that the foundry was pouring metal of the required composition daily.

Another factor which greatly influences quality and is under the control

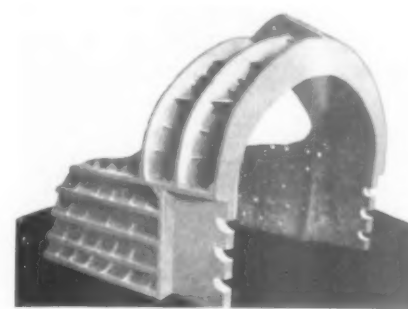
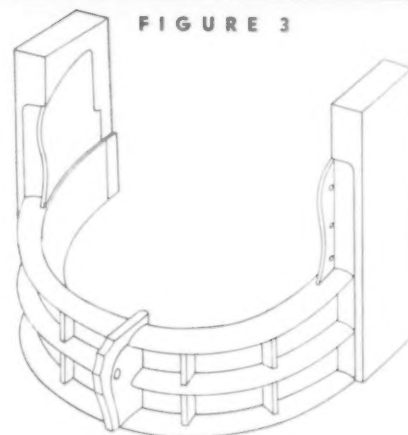


FIGURE 3



of the designer, is that of the simplicity or intricacy of the resulting part. The unnecessary coring of small holes, subsequently machined, the inclusion of small holes, subsequently machined, the inclusion of small relief areas, lightener pockets, bosses, unnecessary minor irregularities of casting surface, classed generally as "Ginger Bread" and finally unnecessary markings such as, name plates, mark poor design.

For the cost angle of casting design under the control of the designer the first and foremost element is that of ranginess. Inasmuch as castings are generally sold on a pound basis the cheapest casting to produce should be



the perfect cube. This would give us the greatest weight per unit of over all dimension and except for the influence of the "yield" figure should be the cheapest to produce.

As a very rough example consider the following as shown on Figure 2. The perfect cube (item A) taken as par is assumed to have a cost value of 100 per pound. Item B then would cost about 110, item C about 140, and item D about 210 per pound.

In general the cost of a casting increases with the size of the mold, which means that on large or rangy work the designer should give some thought to the possibility of making it in two or more pieces, or at least

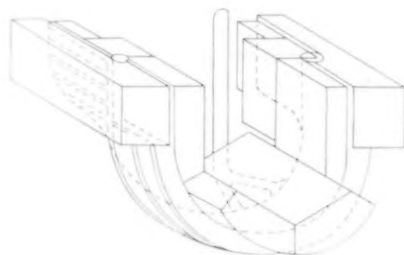


FIGURE 4

balance the cost between that required for one piece against the cost required for two or more parts plus assembly.

Another important cost factor is that of isolated heavy sections requiring separate feeding heads. The matter of the simplicity of the job as mentioned under quality is also of prime importance. Unduly restrictive specifications for chemical or physical tests, test bars out from the castings, on the weld repairs, and unnecessarily close tolerances on dimensions and alignments also add to cost.

### Pattern Design

Of the details of casting design that are under the control of the foundry the matter of pattern design is foremost. In general the quantity of the part to be produced, and the accuracy of dimensions required, determines the type of pattern. Also, as a general statement, the cheaper the pattern is, the more expensive it is to make the mold and the casting, and the less accurate will be the casting. It is frequently possible for a patternmaker to so design a pattern that it will produce a mold, but will make it extremely difficult for the foundryman

## MINIMUM LIMITS FOR PHYSICAL PROPERTIES OF TEST SPECIMENS

Property	Minimum limits for specimens from test blocks of thickness shown			Min. limits for specimens cut from castings
	Thickness 1-1/2"	2-2/2"	3-3/2"	
Yield Point (lb. sq. in.)	80,000	75,000	70,000	75,000
Tensile Strength (lb. sq. in.)	110,000	100,000	90,000	100,000
Elongation (% in 2 in.)	16.5	15.0	14.0	11.0
Reduction of Area	30.0%	28.0%	25.0%	18.0%
Brinell Hardness (Range)	180-220	180-220	180-220	180-220

to produce a casting. The factor of the suitability of pattern equipment to foundry equipment must also be considered.

For an example of these factors, consider the Bucket Hood in Figure 3. In order to mold the job the foundry had to provide either special cope bars, an arbor, or an unnecessarily large flask. Instead of going to the expense required to adapt the method of molding to the pattern some simple core frames were made and the job was molded as shown in Figure 4. The point is that complete pattern equipment should have been furnished to the foundry. The foundryman should not have had to improvise pattern equipment in order to make the job, at a reasonable cost.

Between the pattern shop and foundryman, the closest cooperation is required to facilitate production of the casting of the highest quality at the lowest cost. The position in which the casting is to be molded in order to make it possible to properly gate it, apply shrink heads and utilize to the fullest the principles of controlled directional solidification should be determined by the foundryman who

is familiar with the equipment available, the type of molding process, whether green or dry sand and the solidification and contraction characteristics of his metal. Obviously patterns for carbon steel or the high alloys may require very different treatment.

### Use of Cores

In regard to the size and location of areas to be cored, the effect of a small body of sand upon directional solidification should be fully considered. The use of small cores as lighteners in heavy sections of metal may actually aggravate the shrinkage condition it is intended to eliminate. Since sand is a poor conductor of heat, exposure to a large volume of metal, or location wherever considerable metal will flow over or past it, soon heats the sand to the metal temperature so that it exerts little cooling effect. It may even retard cooling in the area immediately around it. This principle has been advantageously used for years in such applications as the washburn head for necking cores.

Another utilization of this principle is shown on Figure 5 wherein two separate castings were fed by one shrink head or riser by using a splitter core between the two castings. This thin section of sand became at least as hot as the metal in the castings, and being immediately in front of the head helped to keep this section open until solidification was completed.

The establishment of a parting line, the use of cover cores, and the size, location and extent of areas to be cored, the size and extent of core

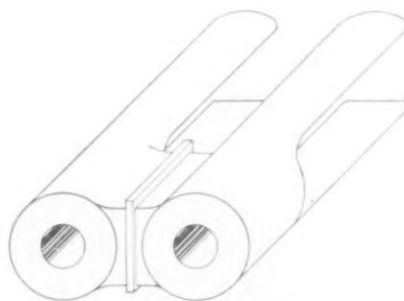


FIGURE 5

prints, necessary clearances between core print and core, allowances for rapping of core boxes, sagging of cores, mold wash if used, draft requirements determined by method of molding, and distortion allowances for design subject to distortion should be carefully determined by the patternmaker before construction.

### Collaboration

Much can be accomplished by consideration of distortion factors. By utilizing shrinkage allowances, or distortion factors, machining time and overall cost on castings is reduced materially.

The matter of loose pieces versus cores should be determined by the foundry and not by the cheapness with which the pattern can be constructed. The possibility of scrapped castings caused by intricate core assemblies or combination boxes should be considered before the cost of more elaborate equipment. All of this is particularly true if the foundryman is asked to quote on a job from the blue print and is not to build the pattern under his own supervision.

Much can be accomplished by close collaboration between the engineering department, the machine shop, the pattern shop, and the foundry. This fact was evidenced by a company which had to make a transmission case. The pattern equipment for the job was produced after an analysis of the manufacturing details in both the machine shop as well as in the foundry and core room.

This study resulted in a slight modification of the design; some bosses were changed in a small way by eliminating cored holes that subsequently were drilled, so that the number of core boxes was reduced from eleven to four. Time required to make the cores was only 26 minutes, a saving of nearly half an hour. Delivery was expedited all through the foundry, costs were cut and the customer was better satisfied.

### Pattern Equipment

A final consideration concerns the influence, particularly on pattern design, of the equipment, processes and practices, of the individual foundry that is commissioned to make cast-

### HEAT TREATING SEAMLESS TUBES FOR LOCKHEED INTERCEPTORS

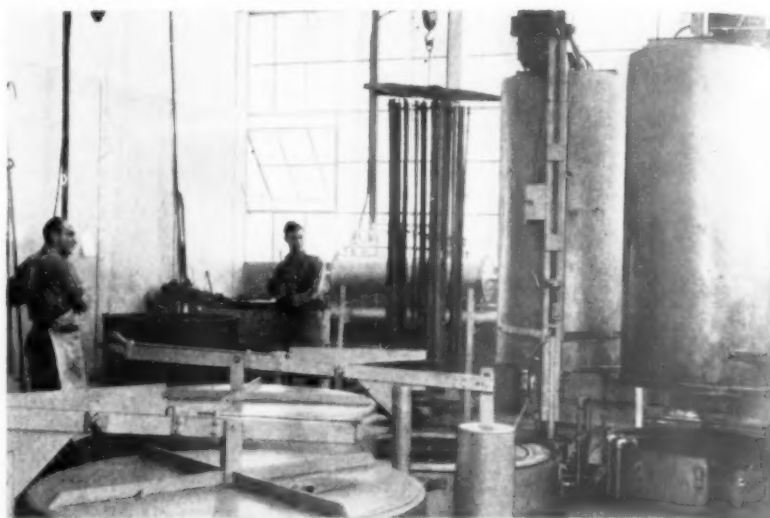


Photo released by Army Air Corps

Vertical cylindrical electric furnaces in the Menasco plant. Inside diameter is 30 inches, suitable for parts 60 inches long.

• Seamless tubes of alloy steel form certain vital parts of the extremely speedy Lockheed Interceptor planes being built in the United States and Great Britain.

In combat these aircraft depend on quick maneuverability as well as speed, therefore the stresses are very high.

Naturally, the tubes require heat treatment to insure adequate strength and toughness. This is accomplished at the Menasco Manufacturing Company by using four cylindrical furnaces for hardening and drawing, and an oil quench tank arranged for water cooling.

The furnaces and gas converters which supply a controlled atmos-

phere, are General Electric products.

Tubes are racked in a carrier which, in combination with a high-speed hoist, facilitates rapid handling. Two quenching hoods are employed to avoid excessive cooling of the thin-walled tubes when the charge is transferred to the tank.

As the charge attains its required temperature, a hoist with transfer hood is brought over the furnace and the charge is quickly placed inside. Then the hood is shifted to a point over the tank and the charge is dropped into the quench.

This method has proved successful in minimizing cooling, warpage and scaling of the tubing.

ings. All foundrymen, some engineers and many patternmakers realize that pattern equipment suitable for one shop may not necessarily serve another, a fact that is no reflection on the foundry concerned.

As an illustration of this, two separate foundries undertook to produce identical castings in their individual shops. Each utilized its own type of pattern equipment. One shop, specializing in dry sand work, had lim-

ited molding machine facilities and desired all castings to be made in cores. The other foundry preferred to make castings primarily in green sand and minimize core work. One used a mounted pattern with five cores, the other a loose pattern which was essentially a core print only, and not less than ten cores.

Both foundries produced acceptable castings, probably at a profit.

THE END

THE TOOL ENGINEER

## MASS PRODUCTION IN METAL CUTTING

• Before the war tanks were hand-built in the United States. With the change from manufacture for defense to building for war, the nation's engineers applied the lessons of American mass production to the job of turning out these 30-ton monsters by the thousands. In Detroit alone the huge Chrysler tank arsenal, with more than 10,000 employees, is at work night and day. Pictured here is an example of the Tool Engineering that has made this production miracle possible. This is a radial drill with an index fixture, for drilling and tapping holes in the 4,000 pound turret casting for the mounting plate of the 37-mm. anti-aircraft gun of the Chrysler medium tank.



## FLAME-HARDENING HELPS CONSERVE SCARCE ALLOY STEELS



Shaft-hardening machine made from up-ended lathe. During hardening, shaft is rotated and flames progress upward, followed by ring quench.

Photos by courtesy of Linde Air Products Company.

Localized heat treatment by flame-hardening, applied to bearing surfaces of tank turret rings. Ring revolves past hardening unit in foreground; tilted turntable disposes of quenching water, which directly follows the heating flames.

ing the core metal's toughness and ductility.

Parts, therefore, can be furnace treated, if necessary, for special core properties and then flame-hardened to produce the desired surface condition.

The process is flexible, so that the hardening effect can be restricted to those surfaces where it is needed. The degree and depth of hardness can be controlled accurately.

Flame-hardening equipment is light and has been found easy to operate. It consists of one or more flame-hardening heads, an oil or water quench and a means of propelling the head and quench at a set speed, or of turning the part being hardened.

**N**ATIONAL emergency steel specifications as announced by the War Production Board cover a number of low alloy steels suggested as alternates for critical standard alloy steels.

By means of oxy-acetylene flame hardening, many of the substitutes can be used for such parts as dies, shear blades, pump liners and piston rods.

A maximum hardness can be imparted to the surface of quench-hardenable steels without changing chemical composition or affect-







Milling master cam from solid on Kearney & Trecker "Milwaukee." Facts on horsepower requirements indicate efficient rate of feed for metal, cutter and machine.

# Milling Cutter Power Requirements

O. W. WINTER

PRESIDENT

AMERICAN SOCIETY OF TOOL ENGINEERS

●Several years ago the author supervised a research project on the question of the power required for milling. This project carried under the joint auspices of the Cincinnati Milling Machine Company and Ohio State University marked at that time one of the outstanding contributions to the subject of milling. This work still stands as the most useable contribution on the subject of milling power requirements. Because of the valuable information involved, the following article is being reprinted from previous issues of The Tool Engineer in accordance with the A.S.T.E.'s policy and program of "passing the know how along."

**Fast, reliable way to determine variables; factors important to production estimating and tool design.**

—This is the first of two articles. Part II will tell how the charts can be put to practical use.

**T**HERE is probably no phase of engineering, wherein more has been accomplished with proportionately so little exact knowledge of the subject, as in the field of machine shop practice, particularly metal cutting. Another way of stating conditions is that there is probably more guessing done in machine shop practice than in any other phase of engineering.

We do not necessarily criticize this condition, as we believe any theory must be tempered with practicability with due consideration of the cost in dollars and cents of applying the theory and consideration of the benefits derived. Too much theory is entirely possible.

Yet there has always been, and still is to a certain extent, a need for more exact knowledge of metal cutting. There have been some very commendable contributions on the subject, but we believe there is much more work to be done.

One of the least understood metal cutting operations is milling. There are reasons for this. In the study of metal cutting, certain important variable factors must be considered and controlled. In milling, as compared with turning or drilling for example, there are an unusually large number of factors to be considered.

## VARIABLE FACTORS

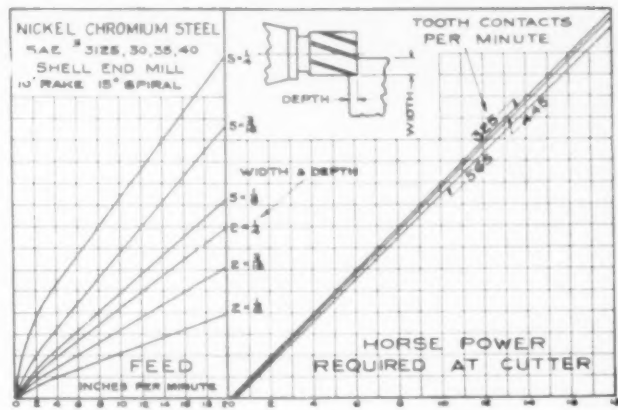
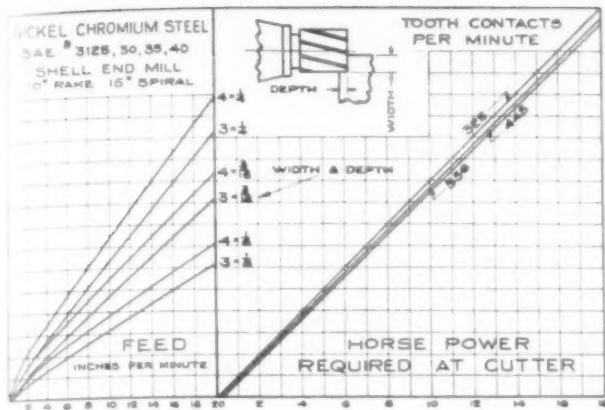
**I**T is generally agreed from past investigations of the subject of milling and is confirmed in many cases by this project, that the following variable factors affect the

efficiency of a milling cutter or rather, the power required to drive a milling machine.

1. The Efficiency of the Machine and Driving Motor (if motor driven).
2. The Material being milled.
3. The Milling Cutter Design.
  - a. Number of Teeth in Cutter.
  - b. The shape of the Teeth, i.e., Rake, Spiral and Clearance angles.
  - c. The Amount of chip clearance between the teeth.
4. The Nature of the Cut.
  - a. Cutting on face or periphery of cutter or both.
  - b. Direction of Cutter Rotation relative to Table Feed.
  - c. Chatter.
5. The Metal Removal.
  - a. Table Feed in Inches per minute.
  - b. Width and Depth of cut.
6. The Shape of the Chips Removed.
  - a. Feed per tooth.
  - b. Depth of Cut.
  - c. Direction of Cut.
7. The Cutting Lubricant.
8. Condition of Equipment.
  - a. Condition of Cutter Edge.
  - b. Condition of Machine.

This is an actual total of 14 variable factors with no effort toward undue ramification.

In order to properly cover only a practical portion of these factors it was necessary to make approximately 35,250 tests to cover the efficiency of 5 types of cutters milling Cast Iron, 4 types milling Nickel Chromium Steel, 4 types on Cast Duralumin.



#### FUTURE PROJECTS

TO COVER the field entirely, approximately 230,000 tests should be made on each material studied. This would involve 9 sizes and designs, each of 5 types of cutters, 45 in all, taking tests of 16 different sizes cuts per cutter at 10 different feeds and 4 speeds and 4 readings for every combination of the above. In addition to this, all tests should be duplicated with cutter rotation with the direction of table feeds as well as against or, both up and down cuttings.

Also on those materials possible similar tests should be made using various cutting materials other than high speed steel for which the above is intended. The practical value resulting from such a coverage of tests wherein not only total power required but pressures developed on the work are noted should warrant the time and expense involved. Observations on cutter life should also be made.

The conditions under which these observations were made, it will be seen later, duplicate as close as possible present day milling practice in regard to cutter design, cutting lubricant used, size of cuts, speeds and feeds encountered, etc.

#### PURPOSE OF THIS PROJECT

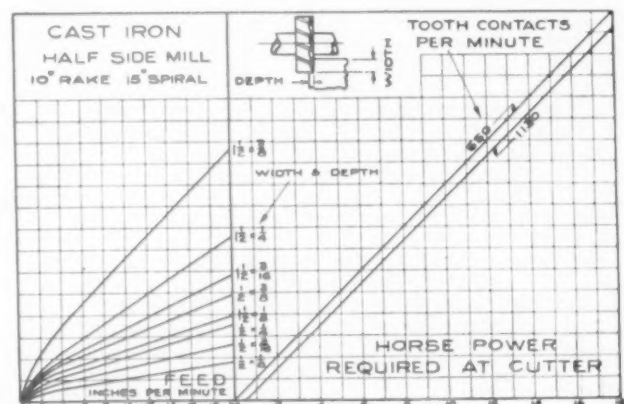
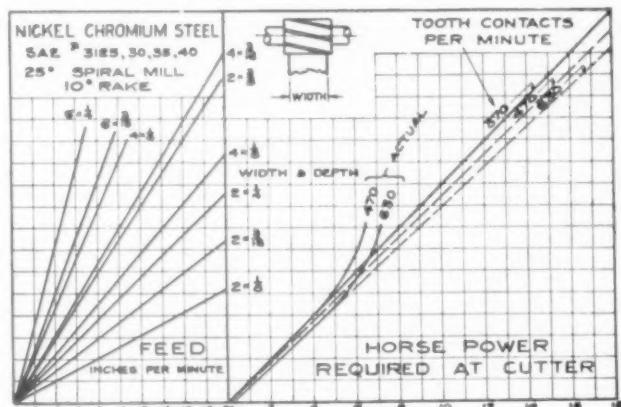
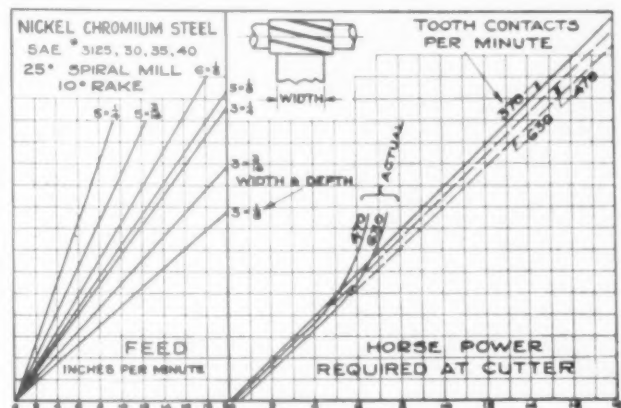
THIS particular project investigates certain variable factors from a basic theoretical standpoint, but its primary purpose is to make available to engineers and shopmen a convenient, quick, yet accurate and reliable means of determining the following:

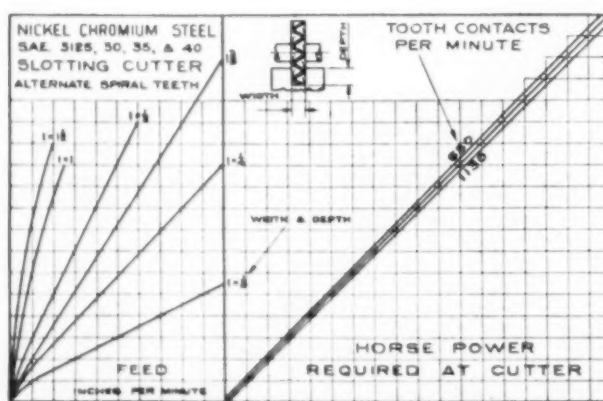
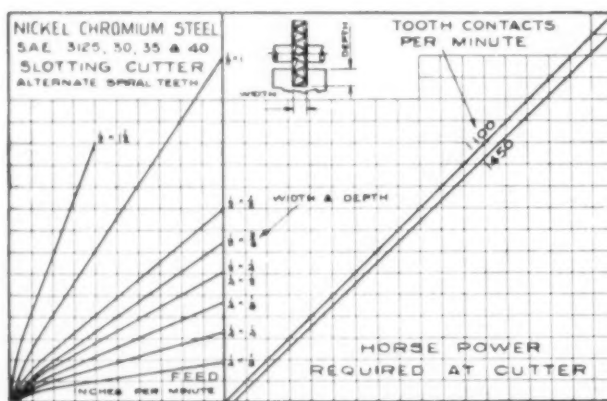
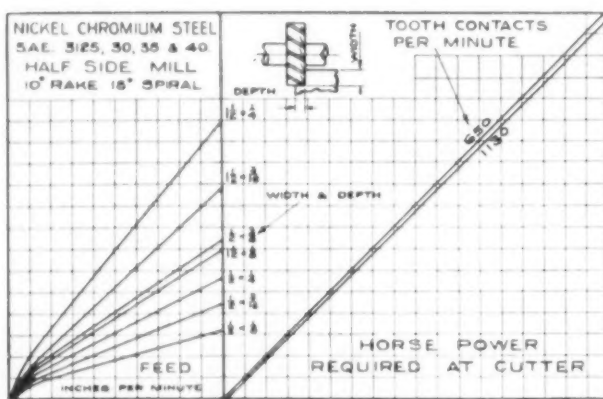
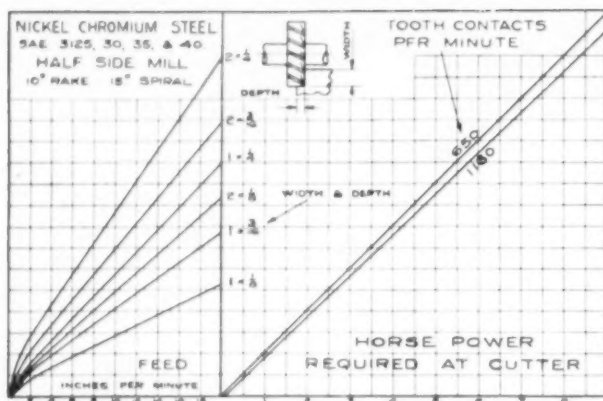
1. In production estimating
  - a. The power required to use a particular rate of feed.
  - b. The size of standard machine needed.
  - c. The size of driving motor required.
  - d. The feed rate allowable with a specific machine and hence the production obtainable.
2. In designing.
  - a. Variable feed cams for either hydraulic or cam feed milling machines.
  - b. Size of motor required or drive parts for special milling machines.
3. In the shop.
  - a. Determining if millers are being used to capacity.
  - b. Determining if they are being overloaded.
  - c. The maximum allowable feed rate for any job in question.

#### SCOPE OF THIS PROJECT

THE project covers the following materials and cutters:

- I. CAST IRON
  1. Shell End Mills
  2. Face Mills
  3. Half Side Mills
  4. Spiral Slab Mills
  5. Slotting Cutters





## II. NICKEL-CHROMIUM STEEL (SAE No. 3125, 3130, 3135 and 3140)

1. Shell End Mills
2. Half Side Mills
3. Spiral Slab Mills
4. Slotting Cutters

## III. CAST DURALUMIN

1. Face Mills
2. Half Side Mills
3. Spiral Slab Mills
4. Slotting Cutters

## IV. WROUGHT DURALUMIN

1. Face Mills
2. Spiral Slab Mills
3. Slotting Cutters

### METHODS AND GENERAL RESULTS

IN the following each previously listed variable factor is discussed and it is shown how this project recognized and accounted for the same.

#### I. The Efficiency of the Machine

The ratio of the amount of power put into a milling machine and the amount delivered to the cutter is a factor that varies with different types and makes of machines. In addition to this the efficiency of the driving motor is a variable factor over different power demands.

One of the first steps in this project was to determine the net efficiency of the driving motor, and the milling machine used, over all speeds and at increments of one horsepower. After half of the cutting tests were run, these efficiency tests were repeated to serve as a check and were confirmed.

The equipment used, consisted of a prony brake mounted on the spindle nose of the milling machine. Through this we were able to determine the horsepower output of the milling cutter versus the watt input to the machine driving motor, measured by a sensitive wattmeter. This was done for all spindle speeds used and from zero to the maximum horsepower available.

It is a known fact among milling machine builders that the power required to feed the table is slight compared with that needed to rotate the cutter. For this reason the efficiency tests of the spindle drive and motor were deemed sufficient for all practical purposes.

In the charts that will follow the horsepower shown is that required *at the milling cutter*. To this figure should be added 10% to 20% additional depending on the design of the milling machine spindle drive under consideration when the power required to drive the machine is desired. Conversely the same amount should be deducted from the power available when the feed rate allowable is being computed.

#### II. The Material being Milled

This was not a study of the machinability of various materials. Yet some light is thrown on this phase of the subject. The materials investigated were:

1. CAST IRON—medium grade  
Short Scleroscope reading 30 to 35.  
Tensile strength 15,000 to 20,000 lbs/sq. in.
2. NICKEL-CHROMIUM STEEL SAE No. 3125, 3130, 3135, and 3140 Annealed.  
Brinell Hardness 140 to 150.  
Tensile strength 90,000 to 100,000 lbs/sq. in.
3. CAST DURALUMIN.
4. WROUGHT DURALUMIN — Brinell hardness 90 to 105.  
Tensile strength 55,000 to 63,000 lbs/sq. in.  
Yield Point 30,000 to 40,000 lbs/sq. in.  
Compressive Strength at least equal to Tensile strength.  
Modulus of Elasticity to 10,000,000 lbs/sq. in.

THE TOOL ENGINEER



In order to avoid inconsistencies in the physical properties of the material used in the tests, four cuts were taken for each test, i. e. for each combination of feed, speed, size, of cut, etc., each cut being taken on a different test block.

The respective machinability of these materials is shown below. With each type of cutter considered are listed the materials in order of ease of machining or power required, the first material listed requiring the least power, etc.

The approximate percentage of increased power requirements of each material over the first listed is also shown. This is a rough figure however and actually varies considerably with various conditions of feed, width and depth of cut, feed per tooth, etc.

1. SHELL END MILLS—Cast Iron 100%—Nickel Chromium Steel 200%.  
(Other materials not tested).
2. FACE MILLS—CAST IRON 100%—Wrought Duralumin 120%.  
Cast Duralumin 155% (No tests made on steel).
3. HALF SIDE MILLS—Cast Iron 100%—Cast Duralumin 112% Nickel Chromium Steel 174% (no tests on Wrought Duralumin).
4. SPIRAL SLAB MILLS—Cast Iron 100%—Nickel Chromium Steel 190%.  
Wrought Duralumin 93%—Cast Duralumin 133%.

NOTE:—A 25 degree spiral mill was used on the first two materials and a 45 degree mill on the latter two, hence the above figures are inaccurate to a certain extent. The individual comparison of the duralumin is:

Wrought Duralumin 100%  
Cast Duralumin 151%

5. SLOTTING CUTTERS—Cast Duralumin 100%—  
Wrought Duralumin 105%.  
Cast Iron 118%—Nickel Chromium Steel 219%.

### III. The Milling Cutter Design

The *Number of Teeth* in a cutter is part of the function of feed per tooth. This is obtained by dividing the feed in inches per minute by the production of the cutter rpm and number of teeth in it. This latter product may be expressed as the number of cutter tooth contacts per minute.

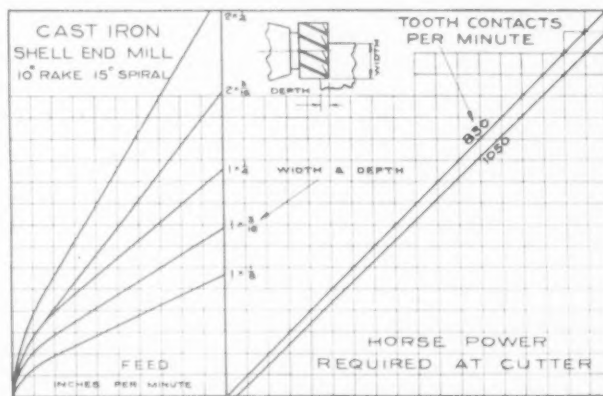
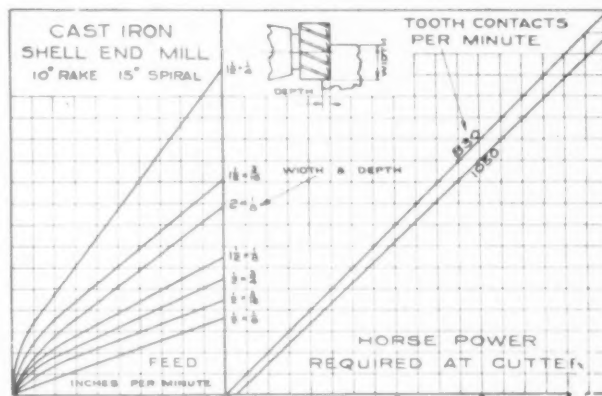
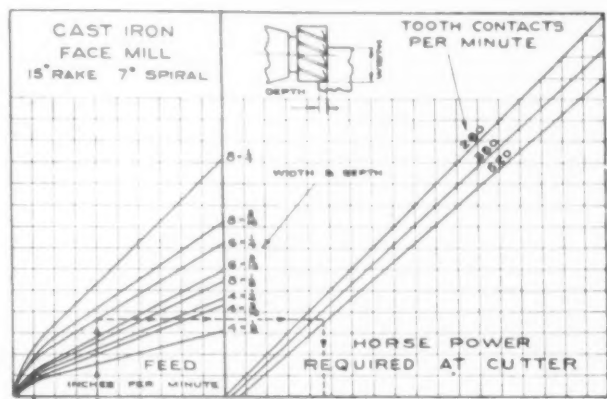
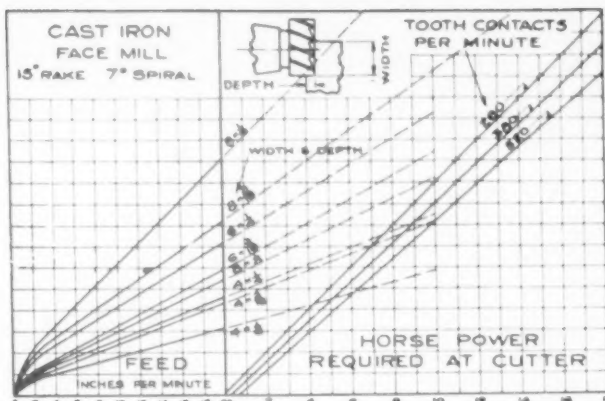
Previous investigations have proven conclusively that the feed per tooth and hence its contributing factors have a definite effect on the power required to mill. Generally speaking the larger chips require less power per volume of metal removed per minute than small chips.

This was found to hold true up to a practical limit where the *chip clearance between the teeth* was insufficient and the cutter became clogged with chips.

This factor is accounted for in the working charts that follow, inasmuch as before the horsepower required is obtained from the feed in inches per minute a correction must be made for the number of *tooth contacts per minute*, which as previously stated is the *product of the cutter rpm and number of teeth*.

The *Shape of the Cutter Teeth*, it has been proven, also have a decided effect on power requirements. This refers to the rake, spiral and clearance angles.

The rake or hook angle is the angle of the front face of the tooth relative to a line perpendicular to and through the axis of the cutter, it has been proven the greatest effect, by far, of the three angles named. In our work we made no attempt to investigate the effect of various rake angles but used cutters of modern accepted design, in which there is little difference in the rake angle specifications of the various cutter manufacturers. The usual rake angle on general purpose solid cutters is approximately 10 degrees. This covers all cutters used in this project excepting inserted tooth face mills.



The *spiral angle* of the teeth, it has been found, has only a slight effect on power requirements provided the angle is not so small as to cause a hammering action and chatter or so great as to cause a prohibitive end thrust on the milling machine spindle. The spiral angle on shell end mills, face mills, half side mills and alternate tooth slotting cutters varies little among the standard cutters manufactured. On spiral slab mills some cutter manufacturers advocate a 45 degree spiral, others 25 degrees. We tried both. A 25 degree spiral mill was used on Cast Iron and Nickel Chromium steel, a 45 degree spiral mill on the Du alumin. A number of tests were made with the 45 degree mill on Cast Iron and the steel with practically no variation in power consumption showing on cuts where the 25 degree cutter cut smooth. On cuts where it chattered however the 45 degree cutter, in some cases, was smoother and required less power (see discussion on chatter).

The *clearance angle* whether it be on the periphery or face of the cutter, was found to have little or no effect on power requirements provided it was neither so great as to cause chatter nor so small as to cause the heel of each cutter tooth to drag. In either extreme the effect was to increase the power required.

#### IV. The Nature of the Cut

In milling Cast Iron we found that on narrow cuts there was slight difference in the metal-removing efficiency of one type of cutter over another except that the alternate tooth slotting cutters were about 6% to 7% more efficient. As the widths of cut increased however, the spiral slab mill cuts showed a decidedly greater power requirement over the face mill cuts ranging from 10% to 70%.

Milling Nickel Chromium Steel, SAE No. 3125 to 3140, there was practically no difference in the relative efficiency of half side mills and alternate tooth slotting cutters, on their particular nature of cut. The spiral slab mill cuts, however, required from 40% to 70% more power and the shell end mill cuts approximately 5%.

Milling Cast Duralumin alternate tooth slotting cuts were found to be on the average 55% more efficient than half side mill cuts of comparable size. On the other hand the face mill cuts were on the average 110% more efficient than the spiral slab mill cuts.

Milling Wrought Duralumin, face mill cuts were more efficient than the spiral slab mill cuts. This ranged from 10% to 55%, the greatest difference occurring at the cuts of small depth. This latter was probably due to insufficient chip clearance in the face mill at the larger depth of cut.

All the foregoing comparisons are with equal widths and depths of cut, equal feed per tooth and feed in inches per minute. It can be seen that generally speaking, face mills and similar end-cutting cutters are more efficient than peripheral cutting slab mills, etc. The amount however will vary with different materials and types of cutters.

It will be noted that in all face mill type cuts covered by the working charts, there was a slight drag on the periphery of the cutter. This was found by experiment to have a negligible effect on the power required. Usually on face mill type cuts the cutting is done entirely on the face of the cutter. Not having to do this however in this project, naturally reduced the waste of test block material and time.

The *Direction of Cut* in all cuts taken in this work was with the cutter rotating against the feed or cutting up.

Subsequent studies have shown that in certain cases greater efficiency is obtained by rotating the cutter with the feed or a climb cut, but under some circumstances less efficiency results. The most common practice in milling is as the tests in this project were run. To investigate the efficiency of hook in cuts provides material for another project of this size or larger.

A *Chattering Cut* required more power than a smooth one. Outside of its deleterious effects, chatter causes wide fluctuations in the power requirements. These fluctuations usually are some way in harmony with the vibrations of the chatter itself. This is probably due to the cutter alternately digging in and receding from the work in addition to vibrating of high pitch, the latter being the more direct cause of the noise. The average of these power fluctuations was found in every case to be greater than the requirements for a non-chattering cut of the same size.

#### V. The Metal Removal

*The power required to drive a milling cutter does not vary directly as the number of cubic inches of material removed per minute.* The effect of these three factors is clearly represented on the charts that follow and the truth of this statement is obvious on investigation.

As far as we have investigated it seems that the product of the width by depth by feed, each having a proper fractional exponent, determined by test for the particular material and cutter under consideration may lead to something like a general power requirement formula. This requires a great deal of additional calculation and research.

#### VI. The Shape of the Chips Removed

There is little known about the relation between milling cutter efficiency and the shape of the chips removed.

One of the factors affecting the chip shape is the feed per tooth. Previous investigations have shown, and this one substantiates, that in general efficiency is increased as the feed per tooth is increased. It is interesting to note that with everything constant and the above holding true, an increase in the feed, in inches per minute, can not cause a proportionate increase in the power required.

Another affecting factor is the depth of cut. When milling with the periphery of the cutter, increasing the depth of cut serves only to increase that part of the chip which logically requires less power to remove. Inasmuch as the greatest power is required at the beginning of the chip, doubling the depth of cut does not double the power required. On the face mill type cuts this is not true. In this case the width of cut varies the chip shape somewhat.

In the working charts that follow, both the depth of cut and feed per tooth, as represented by feed in inches per minute and tooth contacts per minute, are adequately recognized and accounted for.

Another factor affecting the chip shape is the direction of cut relative to the table feed. Again note that all cuts in this project were with the cutter rotating against the table feed.

#### VII. The Cutting Lubricant

The nature of the cutting lubricant used in milling probably affects the power requirements to, as yet, a relatively unknown extent. The coolants used in this project were in accord with current shop practice on the materials milled.

The Cast Iron was cut dry.

The Nickel Chromium steels were cut with 20 to 1 mixture of water and emulsifying oil (Sunoco, manufactured by the Sun Oil Co.)

The Duralumin was milled with straight kerosene. It was found that this gave the best finish and absence from chips sticking to the cutter edges.

#### VIII. Condition of Equipment

The condition of the cutting edges of the milling cutter teeth can cause a considerable fluctuation in power requirements. Fortunately however it was found that the power requirement variations due to cutter condition up to a certain point were moderate. Beyond this point there was a sharp increase in power absorbed accompanied by a detectable appearance of the cutter edges.

At this point the cutters used in the project were

sharpened. In order to obtain a comparable average of readings, as stated before, four cuts were actually taken for each point shown on the charts. Each of these cuts were taken at different periods of the life of the cutter between grinds as much as possible. Also the razor edge resulting immediately after grinding the cutters was worn off before any tests were continued.

These precautions, conscientiously watched, resulted in an average figure for each point on the graphs that was unusually accurate and consistent.

The condition of the milling machine can affect the power required to drive it. It may be loose or weak causing power wasting chatter to occur or the design may be such that comparatively little power is actually delivered to the cutter. (TO BE CONCLUDED)

## ONE SET-UP REPLACES SEVERAL MACHINES

### To Meet Schedules, Gun Producer Builds Special Tools

INGENIOUS application of tool knowledge has solved a perplexing manufacturing problem and contributed to ahead-of-schedule production on a big gun job.

When Fisher Body Division of General Motors undertook production of anti-aircraft weapons of a type among the most powerful known, the plant which was to build the upper carriage found that necessary machines could not be obtained for at least 18 months. Officials of the Ternstedt Manufacturing Division, which was assigned the gun job, had no alternative but to build the machines.

A total of more than 25 boring machines were built. As a result, gun production is far ahead of expectation.

The machines are a unique application of single purpose equipment for multiple duties. Standard type heads were designed, allowing subletting to small available shops, and at the same time placing no additional demands upon large machine tool builders. The remainder of the machines were specially designed and built to suit specific jobs.

One of these machines is doing work for which two or possibly three ordinary boring mills would be needed, and one special set-up of seven machines is doing as much work as 46 to 52 ordinary machines could do on the same job. The saving in time, valuable floor space and manpower is inestimable, not to mention releasing of the ordinary machines to other work.

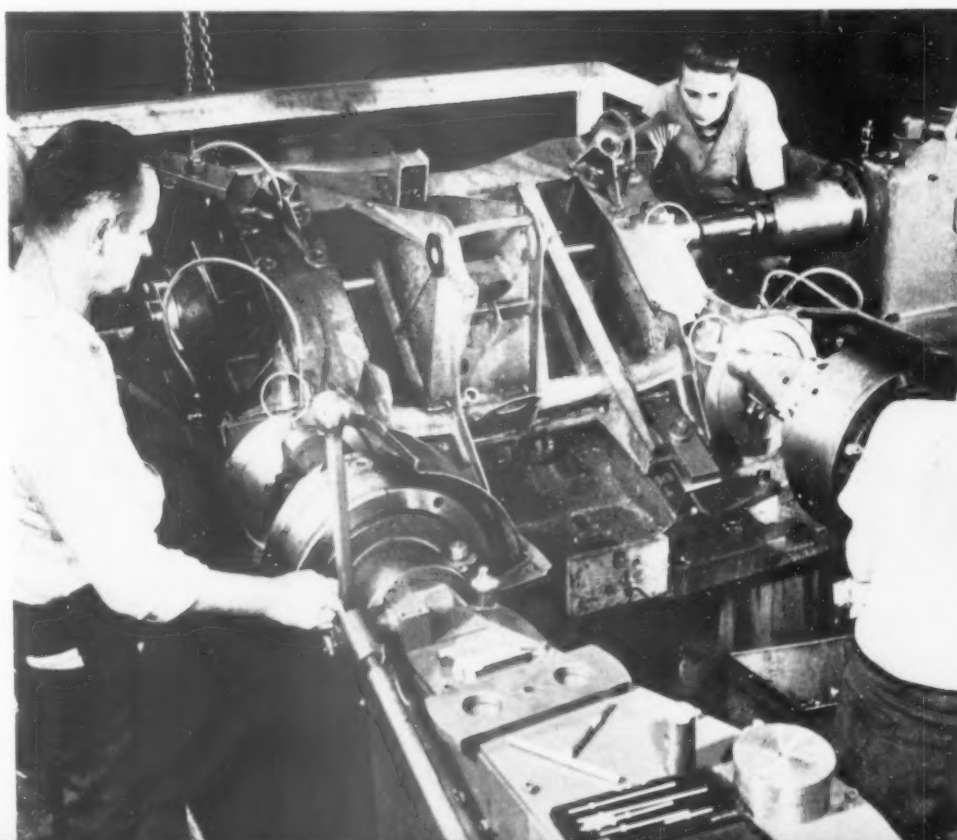
Two and sometimes three boring heads work on one part simultaneously. Thus the part once located, in a fixture has three operations performed

upon it simultaneously. Varied operations such as boring, facing and milling may be performed simultaneously. In one case, a boring head is used for drilling operations, then the same head is used for circular facing on the same fixture set-up. This required designing and building of a facing head which feeds constantly and completely automatically.

The machines have an up-and-down traverse and sideways mobility to permit multiple work on one set-up.

— THE END —

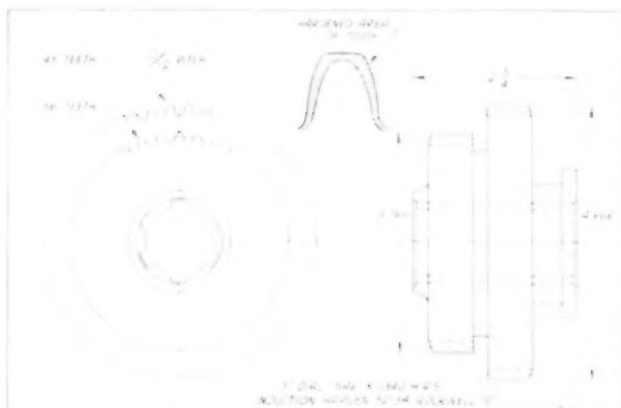
Two machines are better than one, but here are three working simultaneously on anti-aircraft gun. Machines marked 1 and 2 are performing a facing operation; 3 is a boring job.







Above are shown a variety of two and three step gears induction hardened after shaving. They show a Rockwell C rating of 55. Whether hardened all the way through or carburized, to 35 Rockwell C, as is ordinarily the case to permit finish grinding, such gear arrangements as these are difficult to grind at any time. Induction hardening relieves the need of grinding.



Shaving, the final machining operation, removes up to .001-inch on tooth surface. Gears are mounted between centers, and turn freely. Shaver runs stated time in one direction to finish one side of teeth, then reverses. Arbors are made to support teeth as close to cutter as possible. In this photo flared cups support teeth, preventing any flex. Above: detail of part. Small gear, because of obstruction formed by large gear, must be shaped. Pre-shaving cutters are used to allow clearance for shaving operation.



# Hardened Gears Without Grinding

Induction hardening method saves finish grinding operation, permits tougher gears, saves alloy steel

**FRANK W. CURTIS**

CHIEF ENGINEER, MILLING MACHINE DIVISION,  
VAN NORMAN MACHINE TOOL COMPANY

**T**HOUGH three years of experimentation and use lie back of induction hardening of gears in our plant, it is an innovation in the sense of its greatly increased importance as a method which conserves machine operations and alloy steels.

Of major interest is the elimination of grinding hardened gears. After generating or hobbing gears, we generally finish the teeth by shaving up to .001-inch, removing any surface irregularities. Because of the clearance required for shaving, original forming is done with a pre-shaving cutter. Only one operation remains after machining, and that is hardening by the induction method.

## Absence of Scale or Deformation

The absence of scale or deformation, which is characteristic of this method, makes grinding unnecessary. As is shown on the illustration of a Red Line tape reading of surface characteristics, there is virtually no difference in the tooth finish or gear concentricity, either as it appears after shaving or after hardening. In addition to the outright saving of the grinding operation, there are three distinct benefits in this connection.

(1) An operation is eliminated which has always been tough on equipment.

(2) The Tool Engineer does not have to worry about how to grind scale or correct deformation where it has been almost impossible to perform a grinding operation, as in the case of two and three step gears, or with gears where a flange or other obstruction blocked passage of a wheel between the teeth.

(3) Where a gear once may have been heated to only 35 Rockwell C — and the shop generally aimed for the underside of specifications — to permit grinding after hardening, it can now be heated to 50 or 60 Rockwell C, or even higher if more load is to be carried and tooth design offsets dangers of brittleness. Most of our gears are held at 55 Rockwell C, where they can carry a high horsepower load but do not approach the brittle point.

Further, in consideration of machine operations, induction hardening, though it is not entirely singular in this respect, permits localized treatment. On a gear, only the teeth are generally hardened. As illustrated penetration is quite sufficient, but the gear body, arbors or flanges are not affected. If it is in the interest of a more efficient production sequence, machining operations can be performed on these surfaces after hardening as easily as before.

**THE TOOL ENGINEER**

Set-up for induction hardening gears is shown at right. Fixtures for various parts can be changed on machine in about two minutes. A copper tube induction coil, with water running through to cool the coil, supplies heat. Quench ring and base complete fixture. Once time factor is determined, operation is automatic, except for slight hand rotation of gear in fixture to offset any unevenness in the coil.

Especially important today is the saving in alloy steels which this method makes possible. A simple carbon steel, such as X 1340 which we use widely, produces an excellent hardened gear. In fact, as is well known, it is one of those simple steels which when properly case hardened shows a better resistance to wear than heat treated stock. Its good machinability rating is of course one of the main reasons for its selection. THE END.

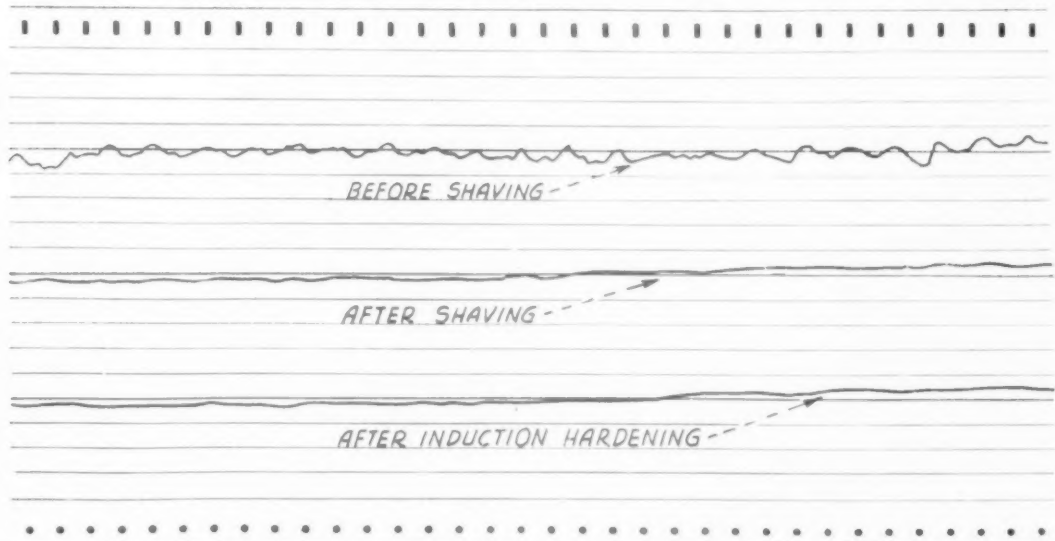


Above is shown a close-up of the fixture. The part is located by a plug in the base. Hardening cycle comprises 12 seconds heat, 9 seconds quench for this two step gear. There is no delay between heat and quench. Gear is heated to 1/16-inch of tooth profile. Hardness penetration is .035 to .045-inch. As can be seen in the top photo on the opposite page, the center of the gear does not heat.

Enlarged reproduction of tape shows results of induction hardening after gear has been shaved to final precision.

The upper line shows gear before shaving. Middle and lower lines show after shaving and hardening — with virtually no discrepancy.

Each graph line represents .001-inch. It is simple to see that induction hardening leaves the work free of scale or distortion.



On a Red Liner gear tester, induction hardened gears are given a running test against an accurate master. A stylus traces on tape any irregularity, in tooth formation, cutter eccentricity, and meshing quality.

# Finding Blank Diameters for Drawn Shells

STANLEY R. COPE

PRESIDENT  
ACME SCHOOL OF DIE DESIGN ENGINEERING

DRAWINGS BY  
LOUIS GALEZIEWSKI, LORENZO PELLETT,  
EDWARD SIUPINSKI

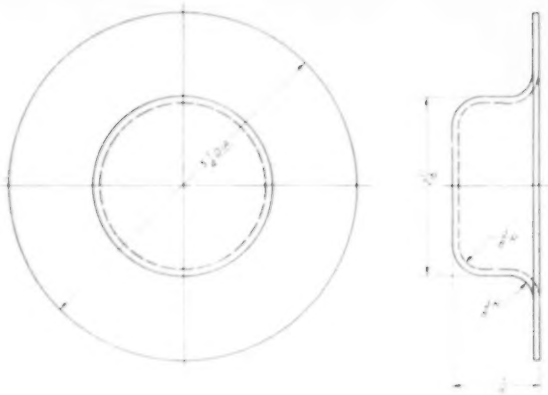


Figure 1. Problem: To find the apex. Blank Diameter of shell shown.

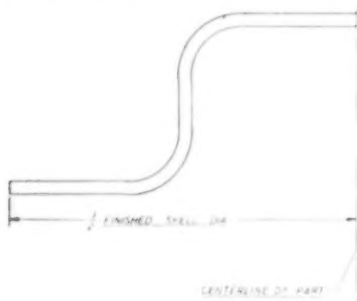


Figure 2. Layout half of shell actual size; 2 to 4 times size for small intricate shells.

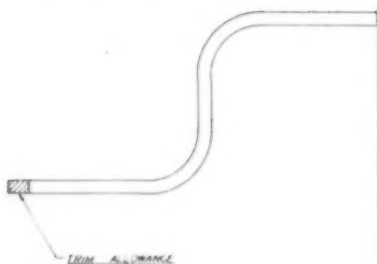


Figure 3. Add trim allowance,— $1\frac{1}{2}$  to 2 times stock thickness on a side at the point of trimming operation.

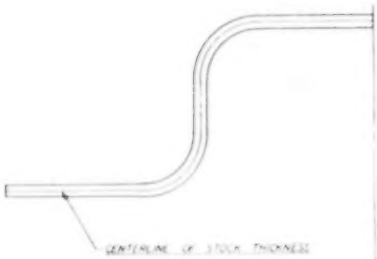


Figure 4. Layout a line through the mean stock thickness. Use this line throughout entire operation.

Right: Figure 5. Divide or separate curved and straight portions into sections and number each.

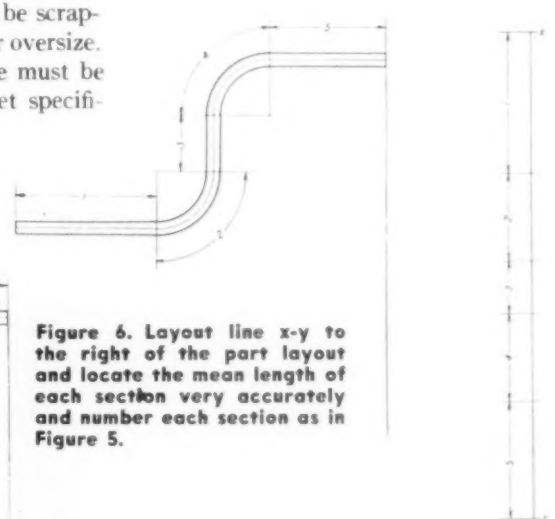
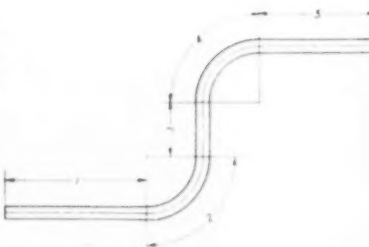


Figure 6. Layout line x-y to the right of the part layout and locate the mean length of each section very accurately and number each section as in Figure 5.

THE most valued and necessary possession of a die designer is a quick method enabling him to accurately compute the blank diameters for the many drawn shells he is asked to lay out operations for.

Such a method is necessary to permit him to figure the number of operations required, because all computations for diameter reductions are started from the blank diameter. Also when laying out the blanking die he must be able to draw the punch and die members to scale to enable him to draw the other die members proportionately around them.

If a designer is without proper formulae or method, his punch and die rings will vary widely from the final development when the correct blank diameter is found by trial. In such cases he will not only be severely criticized for missing the actual blank by a wide margin, but in most cases expensive cutting details must be scrapped because they are under or oversize.

Most important of all, he must be able to provide correct sheet speci-

cations to the purchasing department, which department usually finds it necessary to order material before completion of the dies. This practice does not permit the completing of the dies first, and after finding the blank diameter by trial, hand in the sheet specifications.

Waiting until the blank diameter is found by trial until sheet specifications are given the purchasing department is of course an ideal plan, because it relieves the designer of all responsibility. However, in the average plant, when a part is released for processing, only a few hours may lapse before the purchasing department is clamoring for the specifications. It is a case of every department wanting to get their respective jobs done as soon as possible after the part has been released.



Years ago little preliminary figuring was done. The diemaker simply cut blanks of different diameters and tried them until one was found to be satisfactory. The sheet size was then given to the purchasing department. Since the dies were practically finished when the order for the sheets was made out, it was necessary to let them set for days and even weeks before the steel was received. Modern efficiency has in most cases eliminated this practice. It is now necessary that the sheets be ordered immediately so that they will be available when the dies are completed.

Ordering sheets of material too wide or too narrow, brought about by inaccurate blank computations is even more serious than undersize die rings. This is particularly true of the latter case. Many designers, fearing specifying sheets that will prove too narrow, and not trusting their own ability and method invariably "play safe" by adding to the figured width.

### Wasteful Method

This is naturally a costly procedure to the company employing them. Many thousands of dollars are spent each year in this waste. It is a common sight in pressrooms to see the width of a sheet being fed through a blanking die far exceeding the width that would be satisfactory. Much waste is also found at the end of the sheet because its length is figured in proportion to what the designer thought the width would be.

Very often the end waste far exceeds that which must be allowed for length variation. In a few cases there is even enough over to include another blank, but in many cases the waste will not quite permit the making of an extra blank. With the latter condition the waste is very pronounced. Since the sheets have been ordered, nothing can be done but save the ends for possible future use.

In discussing stock waste it might be advisable to mention that inaccurate blank computations are not the only causes of increased product cost. The thickness of the "bridge" or distance between blanks must not only be scientifically established at the time the die is designed, but it must be maintained in practice. Simple rules are available that when practiced will assure correct allowances.

Another cause of waste is failure to

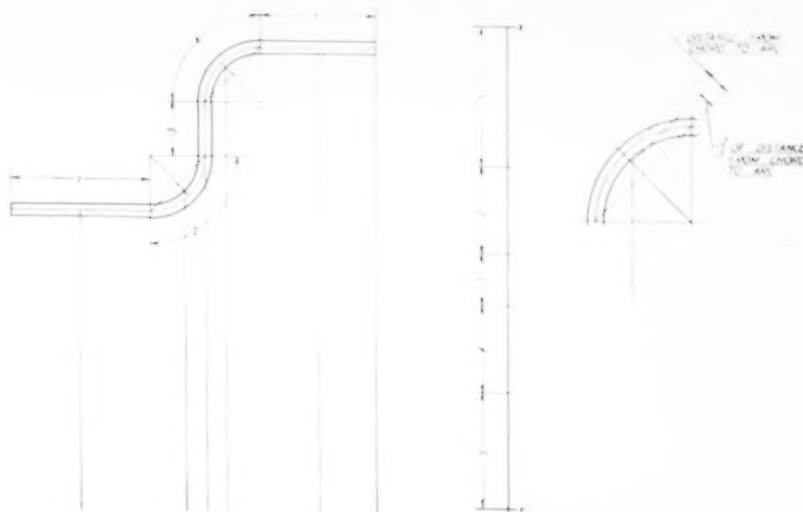


Figure 7. Locate the center of gravity of each section by dropping parallel lines from the centerline of each. Center of gravity at the middle of all straight sections. Curved sections to be determined as in sketch.

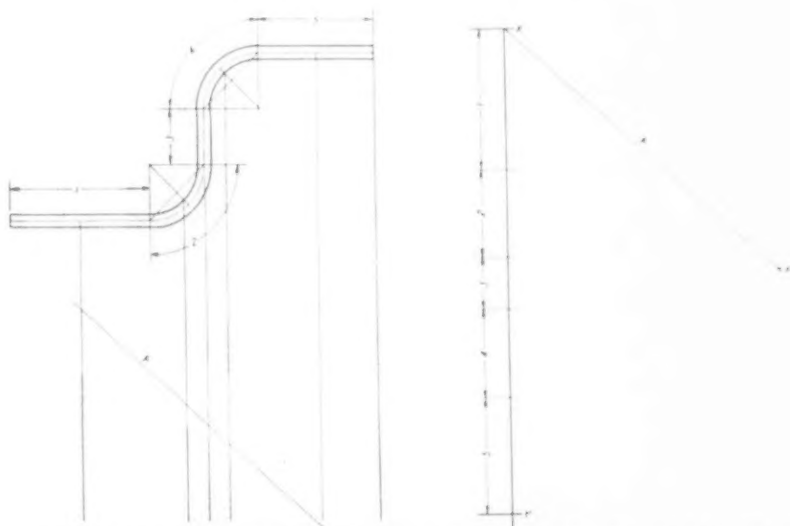


Figure 8. Locate point P to the right and down about  $\frac{1}{2}$  the total length of sections (1 to 5 inclusive) of line x-y. Layout line A between points x-p and also at the same angle (or parallel), starting at the first line of gravity.

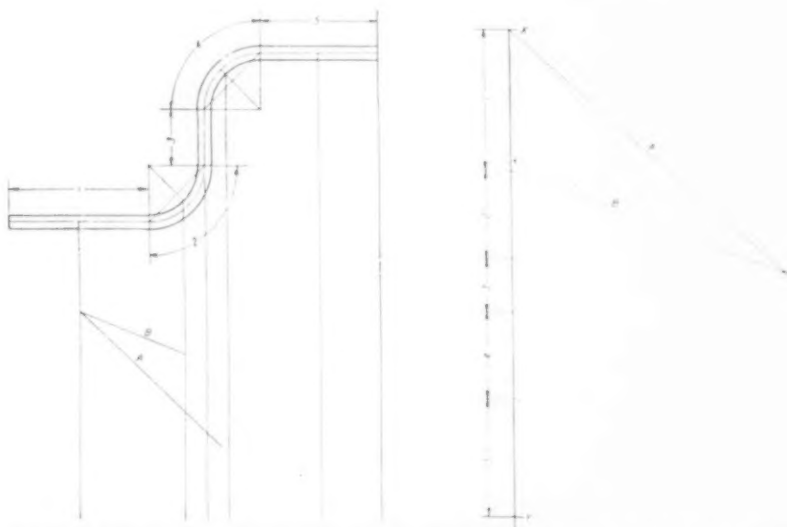


Figure 9. Lay out line B between the two points as shown and draw at the same angle a second line starting at the point where line A bisects the first line of gravity and continuing it to the second line of gravity.

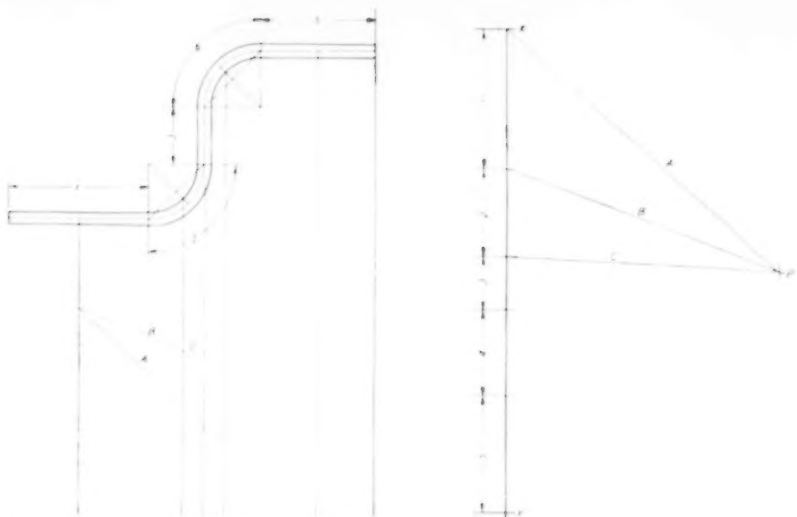


Figure 10. Lay out line C between the two points as shown and draw at the same angle a second line starting at the point where line B bisects the second line of gravity and continuing it to the third line of gravity.

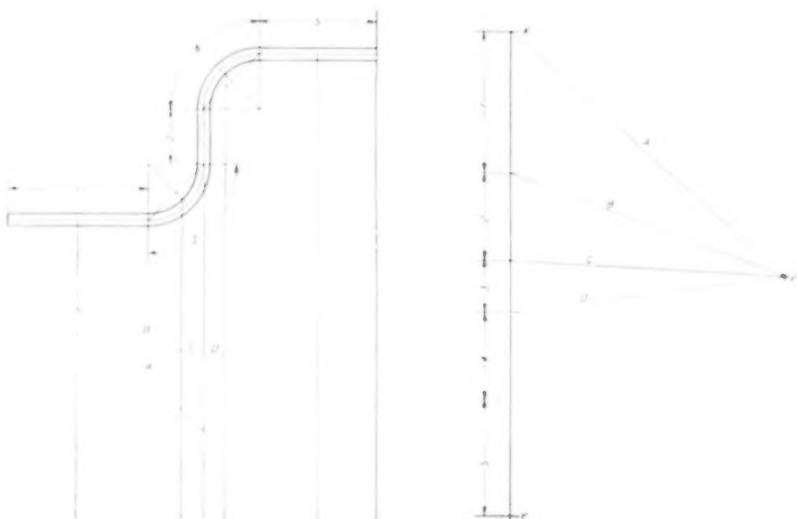


Figure 11. Lay out line D between the two points as shown and draw at the same angle a second line starting at the point where line C bisects the third line and continuing it to the fourth line of gravity.

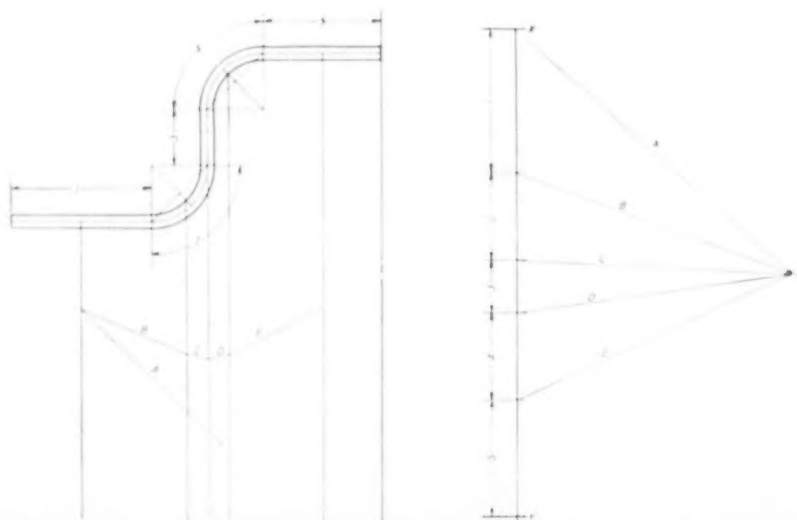


Figure 12. Lay out line E between the two points as shown and draw at the same angle a second line starting at the point where line D bisects the fourth line of gravity continuing it to the fifth line of gravity.

understand width and length tolerances as practiced by the steel mills. All designers or those responsible for specifying or ordering steel sheets should have a "Steel Products Manual" Carbon Steel Sheets, Section 11. It is available from the American Iron and Steel Institute, 350 Fifth Avenue, New York, N. Y. Price per copy is \$.25.

It is surprising among die designers to find so many methods in use and differences of opinion as to how blank diameters should be computed. Some use separate formulae for each type of shell. Others use lengthy, complicated area methods, and still others use various forms of graphical methods. It is easy to see how different companies may employ different methods. Yet when as many as ten or twelve different methods are in use in the same department, most of which contradict each other in answer, some effort should be made toward standardization.

This condition is prevalent in nearly all large designing rooms. I have seen a small designing room employing only two men, both of whom used different methods. To make things worse they even argued with each other about the fallacy of each ones respective method.

### Value of Conference

When these conditions exist among employees, the chief engineer should call a conference. Acting as the conference leader, he should put the question before the group, and remaining silent himself, listen to the arguments until a final decision is reached. The chosen method can then be put into practice. I have found the conference system very satisfactory in finding the best methods. It can be used not only to decide upon the important question how blank diameters shall be found, but on any questions that the designer is confronted with that have more than one solution.

Actually, a designers experience in finding blank diameters depends entirely on what he has been able to read or pick up from others. The practice will continue until some attempt is made to choose among the best methods and standardize its use in all plants.

A few years of such effort in all phases of designing should gradually reduce the profession of die design en-

Right: Figure 13. Lay out line F between the two points as shown and draw at the same angle, but working this time a second line starting at the point where line E bisects the last line of gravity and continuing until it reaches line A.

ginnering to a definite science. It could then be taught in as efficient a manner as mechanical, electrical, civil engineering, and similar sciences. The Acme School of Die Design Engineering is undertaking this problem of standardization of tools and dies.

The graphical method of computing blank diameters as depicted in these pages is limited to round shells where the stock thickness is the same throughout the entire cross section, excepting the natural thinning of a few thousandths which always takes place in drawing operations. Besides being unsuitable for ironed shells, or where the walls are dimensioned to different thicknesses, it will also be found impossible to apply the method to bulged work.

All other shells, including plain, flanged, conical, inside-cut, spherical, or any combination of these will be found very adaptable to this method. Blank diameters for ironed shells must be figured by volume. Bulged work will require the slow area method with proper compensation for thinning of the stock which is not intended but is often excessive with this type of operation.

Since this method will be altogether or in part new to many, except those employed in the few companies using it, each step has been carefully drawn out with complete description of the work done in each step printed below the drawing.

While the process may seem to be difficult and long-drawn-out it is in reality very simple. Like everything else practice will be required to master it. It is suggested that the designer contemplating the use of the method, sketch himself half a dozen shells of different thicknesses and varying shapes and practice by finding the diameters for them. Since practically no figuring is required, success of the operation will be wholly dependent upon the accuracy of your layout. A pointer should be used for marking off

Right: Figure 15. Using line X-T as a radius, lay out an arc to the right. Point T is the point of tangency to the circle with diameter Z.

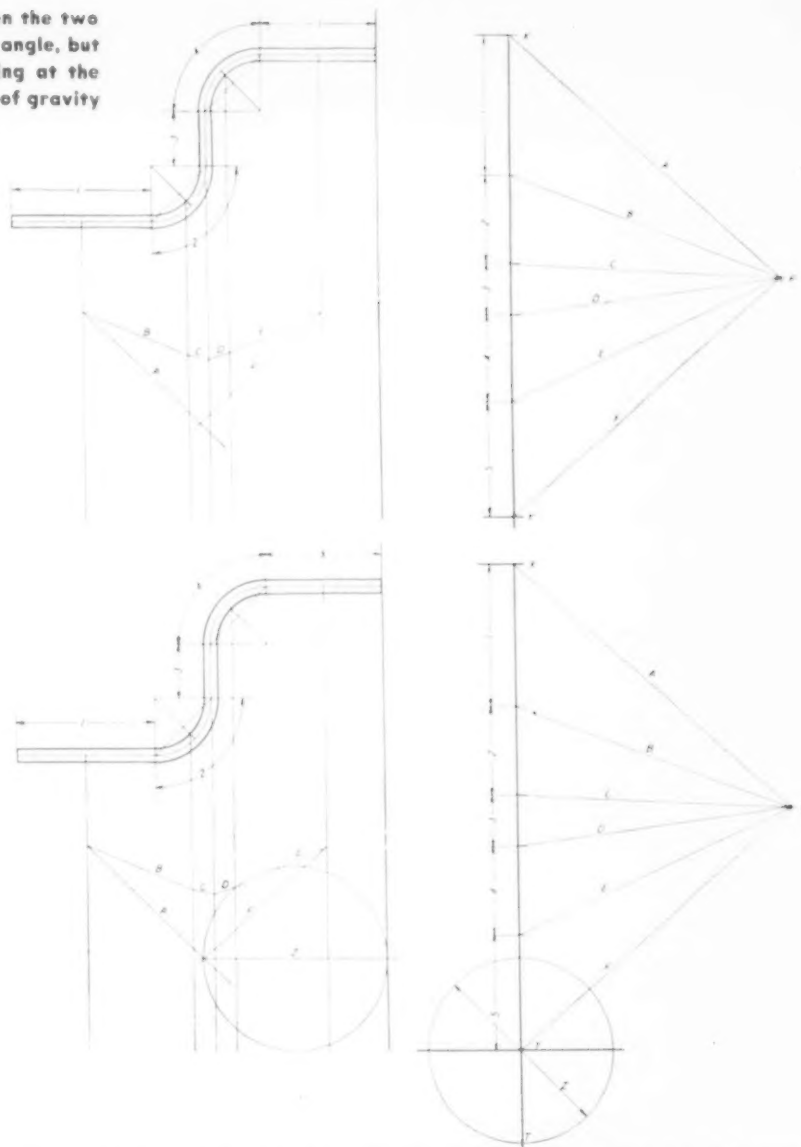
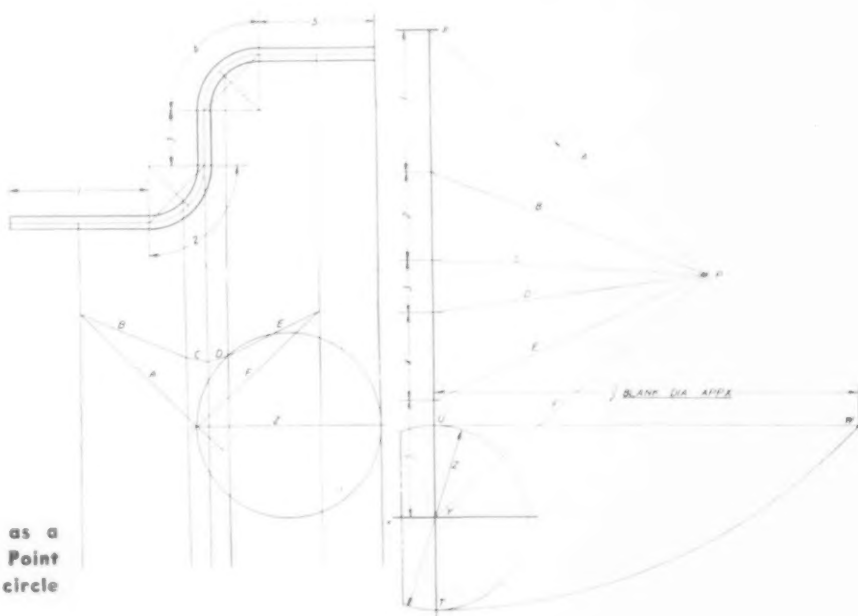
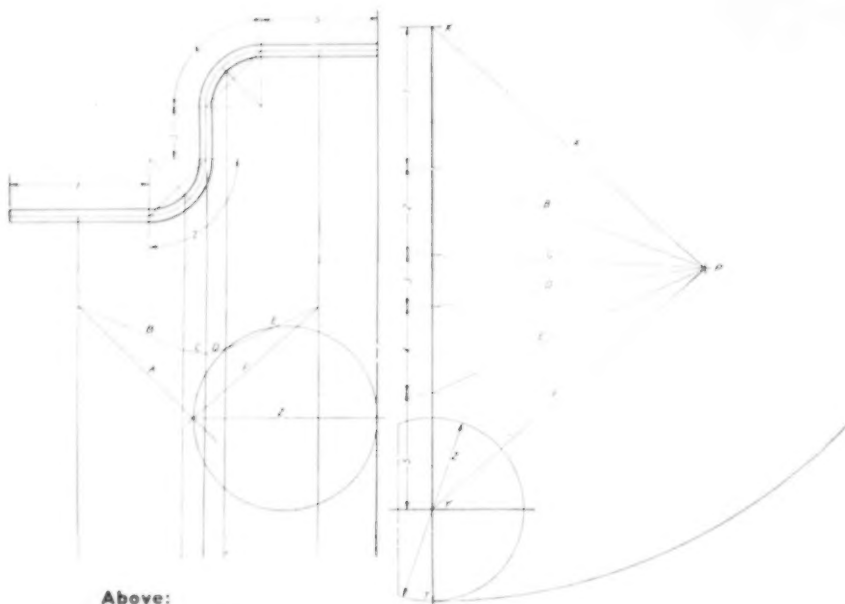


Figure 14. Layout line 2 horizontally from a point where lines A and F meet and continuing to the centerline of the part using this distance as a diameter, draw a circle with the center point at Y as shown.

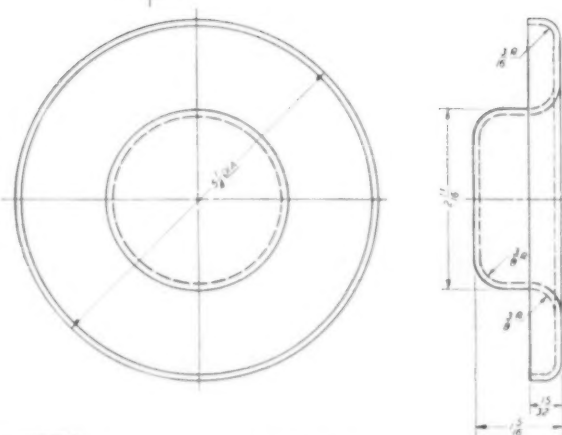






Above:

Figure 16. Locate tangent point U to the circle with diameter Z. Lay out a horizontal line from point U bisecting the arc layout in Fig. 15. This point to be known as W. Scale the line U-W to the nearest half 1/64. This length will be 1/2 the trial blank dia. appx.



71 GA. 100% U.S.S. STEEL

Above: Figure 17. When a shell is to be trimmed before the flanging operation takes place, it is necessary to figure the trimming diameter first and add the trim stock before the blank diameter can be computed.

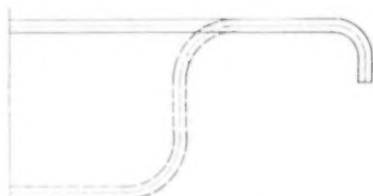


Figure 18. Draw in half of the part accurately excepting that portion indicated by dotted lines. This is not included in computing the trimming diameter because it is formed before the trimming operation takes place. Draw a line through the mean stock thickness.

Below: Figure 19. The same method is used to find the trim diameter as would be used to find the diameter of a shell without the center form.

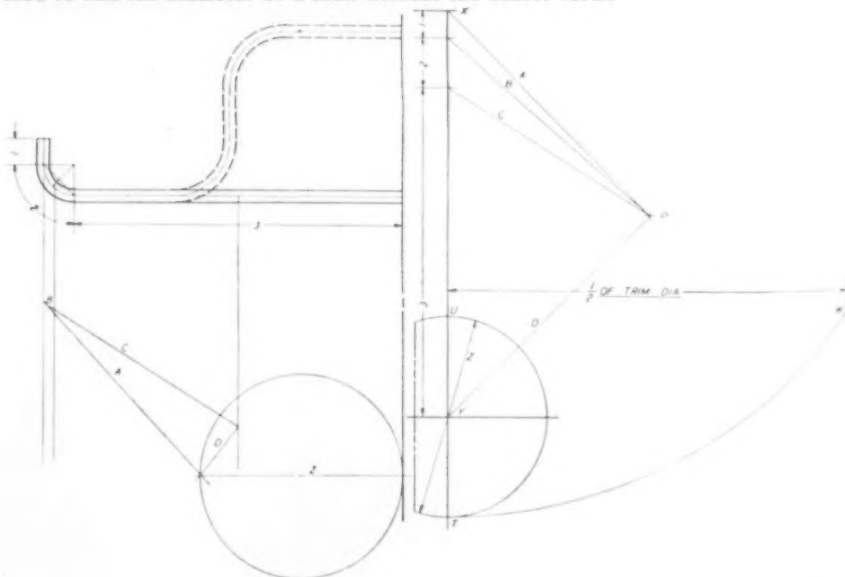


Figure 20. After the trim diameter is known add the trimming stock as shown and using this diameter, ignore the flange on the original part. Then proceed to compute the blank diameter.

distances and a good, hard pencil used in making the layout.

When a shell is to be trimmed before a flanging operation takes place, it is first necessary to find the approximate trim diameter. This can be accomplished by using the same graphical method that would be used if the blank for a simple flanged shell of the same dimensions were required. Simply draw in half of the shell omitting the center formed portion which will have been previously formed. After the diameter has been found add the trimming stock (usually 1 1/2 to 2 metal thicknesses per side). With this diameter and ignoring the flange compute the blank diameter in the regular way.

Figure 17 shows a flanged part that will require trimming after the center has been drawn and before the flange is formed. Figures 18, 19, and 20 depict graphically step-by-step procedure.

This method should not be construed as another method to add still greater confusion to the many existing ways of finding blank diameters. Nor is it claimed in its entirety to be new. It has been used by the writer for at least fifteen years. It represents practically the sole method used for years by some of the largest plants manufacturing pressed-steel parts. After being checked against method after method and found to be the superior of all, it was generally adopted by the Acme School of Die Design Engineering seven years ago when our course of instruction was written.

THE END

# SALUTE TO WAR PRODUCTION CONFERENCE

Sessions will review latest developments in many fields

FRIDAY — OCTOBER 16  
9 A. M.: TRAINING

CHARLES C. GORHAM, Chairman  
Supervisor of Training  
Greenfield Tap & Die Corporation  
Greenfield, Massachusetts

"TRAINING THE AVAILABLE LABOR SUPPLY"  
THOMAS O. ARMSTRONG  
Industrial Relations Manager  
Springfield Plant  
Westinghouse Electric & Manufacturing Company

"THE TRAINING OF WOMEN IN INDUSTRY"  
ARNOLD THOMPSON  
Chief Tool Engineer  
National Steel Car Corporation, Ltd.  
Aircraft Division  
Malton, Ontario, Canada

"EMERGENCY TRAINING"  
S. J. HOEXTER  
Senior Specialist, E.S.M.W.T.  
Federal Security Agency  
U. S. Office of Education  
Washington, D. C.

2 P. M.: INSPECTION

HENRY RICHARDS, Chairman  
Chief Inspector Supercharger Plant  
General Electric Company  
Everett, Massachusetts

"INSPECTION AND INSPECTION EQUIPMENT"  
CARLETON NELSON  
Quality Engineer  
Colt's Patent Fire Arms Manufacturing Company  
Hartford, Connecticut

"ORDNANCE INSPECTION,  
GAGES AND GAGING"  
COLONEL H. B. HAMBLETON  
Office of Chief of Ordnance  
Washington, D. C.

8 P. M.: TOOL CONSERVATION

DR. A. B. KINZEL, Chairman  
Senior Consultant  
Ferrous Metals Section  
Conservation and Substitutions Branch  
W.P.B., Washington, D. C.

"CONSERVING TOOL LIFE THROUGH SALVAGE"  
L. W. LANG  
Manager  
National Tool Salvage Company  
Detroit, Michigan

"EDUCATION IN THE CONSERVATION  
OF PERISHABLE TOOLS"  
ARTHUR A. MERRY  
Production Engineer  
Pratt & Whitney Aircraft  
East Hartford, Connecticut

SATURDAY — OCTOBER 17

9 A. M.: WAR TOOLING  
(Session No. 1)

R. F. V. STANTON, Chairman  
Manager, Sub-Contract Division  
Pratt & Whitney Division  
Niles-Bement-Pond Company  
West Hartford, Connecticut

"DETROIT TOOLS AND TOOLS FOR WAR"  
A. E. CLARK  
Director, Automotive Council for War Production  
Vice President, Budd Wheel Company  
Detroit, Michigan

"EMERGENCY WAR TOOLING  
OF USED MACHINE TOOLS"  
C. GORDON SWEBELIUS  
Vice-President  
High Standard Manufacturing Company  
New Haven, Connecticut

WAR TOOLING (Session No. 2)

JOHN W. GEDDES, Chairman  
Chief Engineer, H. K. Porter, Inc.  
Boston, Massachusetts

"SUB-CONTRACTING HETEROGENEOUS WORK  
TO THE SMALL SHOP"

I. A. HUNT  
Federal Products Corporation  
Providence, Rhode Island

"SINGLE-PURPOSE TOOLING  
FOR THE 90MM. MOUNT"  
E. H. JOHNSON

President  
Johnson Tool & Engineering Company  
Dayton, Ohio

2 P. M.: MATERIALS SUBSTITUTIONS

J. B. SAVITS, Chairman  
Methods Engineer  
Pneumatic Scale Corporation, Ltd.  
Boston, Massachusetts

"ALLOY STEELS FOR THE NATIONAL  
EMERGENCY"

L. S. BERGEN  
Associate Director of Metallurgy  
Crucible Steel Company of America  
New Haven, Connecticut

"PLASTICS AS SUBSTITUTES"  
P. S. CARSWELL, C. H. WHITLOCK  
Director of Research Tech. Engineer  
(Chemistry) (Applications)  
Monsanto Chemical Company  
Springfield, Massachusetts

"THE GREATEST GIFT IS AN OPEN MIND"  
Speaker: THOMAS H. BECK  
President  
Crowell-Collier Publishing Company  
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● MORE than 300 manufacturing plants in Springfield produce a diverse line of products with a value of more than 100 million dollars annually. These include machine tools, rifles, revolvers, pumps, magnetos, electric control and time equipment, motorcycles, and Diesel motors.

## Springfield meeting can bring peace earlier to the freedom-loving world



IT may be everybody's war to the man on the street, but Tool Engineers going to Springfield are making it their individual battle, as though victory depended on them alone. They are the men who are taking obsolete machinery and making guns, tanks and planes. They are making every foot of floor space deliver 400% more production than in 1940 and 1941.

Come October 16-17, these men are gathering close to the birthplace of liberty and of mass production which has brought to America the world's highest standard of

living. They are taking their secrets for winning the battle of production. They will take away new ideas which can shorten the war.

We believe this, because as this is written we know what 100 extra planes might do for Russia at Stalingrad. Until war ends, those extra planes can always be effective to bring peace weeks, months and even years earlier. We are confident that these Tool Engineers—the high command of production—will return to their plants to accomplish this feat.

# A.S.T.E. COMMITTEE STRUCTURE

**N**OW in its tenth year and under the presidency of Otto Winter, the national committee structure of the American Society of Tool Engineers has undergone a change which can produce some of the most far-reaching effects of any movement in the history of the Society. Committees have been set up on an area basis which extends responsibility and benefits to every one of the fifty-five chapters comprising one of the most active and vital engineering bodies in the mass war production picture.

The growth of this Society is one of the phenomena that made

the American industrial front the most potent factor in today's conflict. Three years after its formation in Detroit, The American Society of Tool Engineers started on the road to national organization by chartering chapters in Racine, Cleveland and Milwaukee. Today that continued growth has demanded a delegation of responsibility through a national committee covering each major activity of the Society. A breakdown of the committee structure is presented here, both by title and by names of the men heading up the various departments.



## CONSTITUTION & BY-LAWS COMMITTEE

Chairman  
**ROBERT M. LIPPARD**  
Ass't. Sales Manager  
Heald Machine Co.

## New England Area

Vice-Chairman  
**IRWIN F. HOLLAND**  
General Sup't. of Small  
Tool & Gage Dept.  
Pratt & Whitney Div.  
Niles-Bement-Pond Co.

### Assistants

**E. R. CAHOON**  
Ass't. Foreman  
Hyde Windlass Co.  
**EDWARD BLAKE**  
Owner  
Edward Blake Company

**W. N. METCALF**  
Tool Engineer  
Chapman Valve Mfg. Co.

**HARRY KING**  
Mech. Draftsman  
Fellows Gear Shaper Co.

**WILLIAM F. JARVIS**  
Plant Sup't.  
The C. L. Jarvis Co.

**ALTON V. POLLARD**  
General Foreman of Die Shop  
American Brass Co.

**J. P. CUNNINGHAM**  
Vice-President  
Potter & Johnston Mach. Co.

## Middle Atlantic

Vice-Chairman  
**JOHN A. McMONAGLE**  
Master Mechanic  
The Atlantic Refining Co.

### Assistants

**PERCY HOBBS**  
Methods Engineer  
Sperry Gyroscope Co.

**P. W. BROWN**  
Gen. Factory Superintendent  
Wright Aeronautical Corp.

**LESTER H. COLLINS**  
Tool Engineer  
Carrier Corporation

**W. H. POWELL**  
General Foreman  
General Electric Co.

**W. B. RAPP**  
Owner  
W. B. Rapp Co.

**JOSEPH C. PARDO**  
Secretary  
B. H. Hubbert Co.

**J. L. LUBER**  
Master Mechanic  
U.S. Naval Torpedo Station

**EDWARD J. CARLTON**  
Foreman  
Ingersoll Rand Co.

**FRED W. HEIDTMAN**  
Foreman  
Endicott Forging & Mfg. Co.

**M. I. BRADLEY**  
Plant Manager-Lycoming Div.  
The Aviation Corp.

**JOSEPH A. BRUST**  
Tool & Die Designer  
York Safe & Lock Co.

## Southern Area

Vice-Chairman  
**WILLIAM OSWALD**  
Vice President and General  
Manager  
Eastman Mfg. Co.

### Assistants

**THOMAS J. MOULTON**  
Press Room Foreman  
Dortch Stove Works

**JAMES R. WEAVER**  
Manager-Louisville Ord.  
Division  
West. Elect. & Mfg. Co.

**LELAND DOLEN**  
Cutter Supply Co.

**JOHN J. McNEFF**  
Lead-Man Tool Design  
North American Aviation

**E. V. ALEXANDER**  
Coordinator, Eng. & Tooling  
Boeing Aircraft Company

## Middle West Area

Vice-Chairman  
**ED. DICKETT**  
Proposal Engineer  
Sundstrand Mach. Tool Co.

### Assistants

**GEORGE A. STASSUS**  
Tool Engineer  
Merz Engineering Co.

**LORENZO A. PELLETT**  
Die Designer  
Bendix Products Div.

**FRANK M. KINCAID**  
Chief Tool Designer  
Edwards Valve & Mfg. Co.

**CHAS. ADAMS**  
Managing Partner  
Twin City Die Casting Co.

**LEO REULAND**  
Chief of Small Tool  
Eng. Dept.  
Barber-Colman Co.

**IVER SOLSRUD**  
Foreman  
Seamen Body Corp.

**EUGENE BOUTON**  
Chief Eng. of Wisconsin  
War Production Board

**R. J. KRAUT**  
Vice-President  
Giddings & Lewis Mach.

**ED. TITUS**  
Engineer  
Rosen Machine Co.

**HERMAN J. KRIE**  
Tool Inspection—Foreman  
Caterpillar Tractor

**G. STANLEY CASH**  
Equipment Engineer  
Curtiss Wright Corp.

## Central Area

Vice-Chairman  
**WALTER WAGNER**  
Sup't.  
Ford Motor Co.

### Assistants

**A. R. CHRISTENSEN**  
Designer  
Harrison Radiator Div.

**H. G. EISELE**  
Mfg. Engineer  
West. Elect. & Mfg. Co.

**EARL DeBISSCHOP**  
Sup't. of Metal Dept.  
Folmer-Graffex Co.

**FRANK DENNING**  
General Manager—Treasurer  
Denning Manufacturing Co.

**WILLIAM GIRKINS**  
Engineering Draftsman  
Owens Staplified Brush Co.

**W. J. FREDERICK**  
Owner  
Frederick Steel Co.

**HERMAN O. POOCK**  
Asst. Master Mechanic  
Inland Mfg. Div. G.M.C.

**E. A. LOWRY**  
Chief Engineer  
Ranco Company

**ROY BAILEY**  
Chief Engineer  
Detroit Power Screw Driver

**ALFRED E. CURTIS**  
Tool Supervisor  
Sealed Power Corp.

## Western Area

Vice-Chairman  
**JACK MARVIN**  
Treasurer  
Dayton-Marvin & Bakewell

### Assistants

**E. F. WOOSTER**  
Tool Designer  
Solar Aircraft Corp.

**H. H. HAGEDORN**  
Sales Engineer  
Pacific Abrasive & Supply Co.

**R. K. MELTON**  
Project Preliminary Tool Eng.  
Boeing Aircraft Co.

## Canadian Area

Vice-Chairman  
**ED. L. GREER**  
Manager  
Canadian Fairbanks-Morse Co.

### Assistants

**EDGAR BARKER**  
President  
Modern Tool Works, Ltd.

## EDITORIAL COMMITTEE

Chairman  
**ANDREW RYLANDER**  
Master Mechanic,  
Consulting Engineer,  
In Charge of Sub Contracts  
Midland Steel Co.

## New England Area

Vice-Chairman  
**C. J. LINDBEREN**  
Ass't. Sup't.  
Crompton & Knowles

### Assistants

**VICTOR ERICKSON**  
Grinding Engineer  
Norton Company

**J. H. BULSON**  
Sales Engineer  
Edwards & Walker Co.

**PAUL MILLER**  
Sup't.  
Tubular Rivet & Stud. Co.

**KENNETH ABBE**  
Sup't.  
Moore Drop Forging Co.

**GEORGE NISBET**  
Specifications Engineer  
Jones & Lamson Machine Co.

**ROBERT E. MORRIS**  
Owner  
R. E. Morris Company

**M. J. WELDON**  
Metallurgist  
Henry G. Thompson &  
Son Company

**HORACE ST. AMANT**  
Chief Designing Engineer  
Johnsen Automatic Mfg. Co.

## Middle Atlantic

Vice-Chairman  
**A. H. MITCHELL**  
Tool Planning Super.  
New Process Gear Co.

### Assistants

**E. VALET**  
Tool Control Supervisor  
A. Schraders Sons

**MARTIN T. BERRY**  
Tool Supervisor  
Easy Washer Corp.  
Aviation Division

**W. A. NELSON**  
Super. of Planning &  
Wage Rate-Bldg. No. 48  
General Electric Co.

**STUART H. McCAUGHEY**  
Vice-President  
M. S. Willett, Inc.

**E. C. REDFIELD**  
Chief Tool & Gage Des.  
U.S. Naval Gun Factory

**JOHN R. LYNCH**  
Tool Sup't.  
Ingersoll Rand Co.

**EDWIN P. BURGER**  
Equipment Engineer  
Scintilla Magneto Div.

**HARRY S. TAYLOR**  
Chief Tool Checker  
Lycoming Division  
The Aviation Corp.

**W. S. GRABY**  
General Supervisor  
York Ice Machine Co.

## Southern Area

Vice-Chairman  
**H. E. COLLINS**  
Foreman  
Hughes Tool Co.

### Assistants

**LUDWIG DONNER**  
Chief Tool Engineer  
Vultee Aircraft, Inc.

**JOHN BUNKER**  
Super. of Inspection  
West. Naval Ord. Plant

**W. MCKENZIE**  
Engineering Dept.  
Hughes Tool Co.

**H. RUTHERFORD**  
Tool Maker & Die Maker  
Eastman Mfg. Co.

**C. H. SPECK**  
Liaison Engineer  
Cessna Aircraft Co.

## Middle West Area

Vice-Chairman  
**WALTER RINGLING**  
Sup't. of Engineering  
National Youth  
Administration

### Assistants

**STANLEY R. WEIDMAN**  
Owner  
Hoosier Engineering Co.

**JOHN L. SCHOHL**  
Tool Engineer  
South Bend Screw Mach.  
Works

**JOS. T. BRANIT**  
Master Mechanic  
Borg & Beck Div. of  
Borg Warner Corp.

**W. A. AHLBERG**  
Machine Shop Foreman  
Brown & Bigelow

**ERNEST SEBORG**  
Electrical Engineer  
Barnes Drill Co.

**ROY A. RADTKE**  
Sup. of Industrial Arts  
Boys' Tech. High School

**ROYAL A. BEACH**  
Engineer & Designer  
Dumore Co.

**HENRY S. FAITH**  
Production Engineer  
Giddings & Lewis Mach.  
Tool Co.

**TOM BROWN**  
Tool Designer  
Reynolds Engineering Co.

**EARL J. KANE**  
Machine Designer  
Caterpillar Tractor

**ERNEST CLARKE**  
President  
Clarke Equipment Co.

## Central Area

Vice-Chairman  
**MILTON L. ROESSEL**  
Tool Engineer  
Rechester Products  
Div. General Motors

### Assistants

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Chief Tool Designer  
Houde Eng. Corp.

**W. D. SHIELDS**  
Chief Engineer  
Edward W. Voss Co.

**EARLE DeBISSCHOP**  
Sup't. of Metal Dept.  
Folmer-Graffex Co.

**ED. BAUMGARDNER**  
Designer  
National Carbon Co.

**GEORGE A. IRWIN**  
Super. of Tool & Die Dept.  
Goodyear Aircraft Corp.

**ALBERT HAGE**  
Chg. Follow-Up Dept.  
Pur. Tools & Fixtures  
Spicer Mfg. Corp.

**C. W. STRICKER**  
Sales Engineer  
Auto Sun Products Co.

**PATSY DIFLOURE**  
Chief Tool Designer  
W. B. W. Tool Company

**J. N. EDMONDSON**  
Engineering Instructor  
Ohio State University

**GRANT WILCOX**  
Chief Tool Engineer  
Plymouth Motor Co.

**HAROLD SCARFF**  
Master Mechanic  
Muskegon Piston Ring

## Western Area

Vice-Chairman  
**To Be Appointed**

### Assistants

**A. C. BARLOW**  
Ass't. Superintendent  
Naval Department  
Bureau of Aeronautics

**ARTHUR DENIS**  
Tool Engineer  
Criterion Machine Co.

**LESTER P. MARTIN**  
Planning Engineer  
Production Engineering Co.

**KENNETH E. BERGESIN**  
Tool Liaison Engineer  
Boeing Aircraft Co.

## Canadian Area

Vice-Chairman  
**WILLIAM A. DAWSON**  
Otis-Fensom Elevator  
Co., Ltd.

### Assistants

**R. E. CRAWFORD**  
Editor  
"Canadian Machinery &  
Mfg. News"

**ROBERT YOUNG**  
Board of Education-Super.  
Westdale War Emergency  
Tool & Die

**A. ROSZEL**  
Montreal Representative  
A. G. Wickman, Ltd.

## INDUSTRIAL RELATIONS COMMITTEE

Chairman  
**EARL V. JOHNSON**  
Engineer  
Firth-Sterling Steel Co.



# A.S.T.E. COMMITTEE STRUCTURE — Continued

## New England Area

**Vice-Chairman**  
W. W. YOUNG  
Sales Engineer  
Pratt & Whitney Co.

**Assistants**  
WILLIAM E. LOY  
Sales Manager  
Union Twist Drill Co.  
THOMAS BARKER  
Machine Shop & Tool  
Foreman  
Bangor & Ansonlock, R. R.  
ROBERT W. McLEAN  
Plant Manager  
United Shanks & Findings Co.  
R. S. BROWN  
Sales Engineer  
Henry Printiss & Co., Inc.  
JOSEPH B. JOHNSON  
General Manager  
Bryant Chucking Grinder Co.  
A. D. LINDSTROM  
Engineer-Keller Eng. Dept.  
Pratt & Whitney Div. N.B.P.  
HENRY J. BELLEMORE  
Chief Inspector  
High Standard Mfg. Co.  
ROBERT B. PARKER  
Contract Manager  
Franklin Mach. & Fdy. Co.

## Middle Atlantic Area

**Vice-Chairman**  
THOMAS P. ORCHARD  
Super. Jr. Tool Des. Dept.  
Wright Aeronautical Corp.

**Assistants**  
HOLBROOK L. HORTON  
Associate Editor  
"Industrial Press"  
ERIC PREECE  
Methods Supervisor  
Wright Aeronautical Corp.  
KENNETH C. RANDALL  
Sales Engineer  
H. A. Smith Machinery Co.  
FRANK FRITZ  
General Foreman  
Hys. Control, Bldg. No. 285  
General Electric Co.  
O. E. CHRISTOPHERSON  
General Manager  
Hires, Castner & Harris, Inc.  
JOHN E. FREYMAN, Sr.  
Owner  
John E. Freyman & Son  
E. W. BOWEN  
President  
Bowen Instrument Co.  
M. W. DENSON  
Asst. Sup't.  
Shepard-Niles Crane & Hoist  
Corp.  
JOSEPH D. AHEARN  
Office Mgr. & Engr. Ass't.  
Universal Insols. & Metal  
Co., Inc.  
W. DEWITT LEINBACH  
Manager  
Millon Machine Works  
JOHN H. SMART  
Methods Engineer  
York Ice Machine Co.

## Southern Area

**Vice-Chairman**  
H. T. SPROTT  
Asst. Sup't.  
Phillips & Butterff Mfg. Co.

**Assistants**  
L. V. JOHNSTON  
Partner  
L. V. Johnston Tool Co.  
CLARENCE E. SHIPLEY  
Superintendent  
West. Naval Ordnance Plant  
L. M. COLE  
Manager  
Warner & Swasey Co.  
FREDERICK LENZEN  
Instrument Shop Foreman  
Eastman Manufacturing Co.  
JAMES WILEY  
Mfg. Engineer  
Boech Aircraft Corp.

## Middle West Area

**Vice-Chairman**  
ERNEST H. NIEMAN  
Sup't.  
Carter Carburetor Corp.

**Assistants**  
ALVEY F. PITTMAN  
Chief Tool Engineer  
The Prest-O-Lite Co., Inc.  
SVEN G. GORANSSON  
Tool Engineer  
Union Special Mach. Co.  
K. K. ROBY  
Chief Engineer  
Minneapolis Honeywell  
Reg. Co.  
GEORGE H. CARLSON  
Vice President &  
Machine Designer  
Ekstrom, Carlson & Co.  
WILLIAM G. NICHOL  
President  
Nichol Machinery Co.  
PETER SOENS  
Sup't.  
Webster Electric Co.  
W. E. RUTZ  
Works Manager  
Giddings & Lewis Mach.  
Tool Co.  
ROSS DICK  
Equip. & Tool Engineer  
Deere & Company  
JAMES L. LEFLER  
Supervisor Machine Design  
Caterpillar Tractor Co.  
WALTER F. LINDERS  
President  
Northwestern Machine Co.  
LOUIS A. NEMETH  
Tool Designer  
Hill & Cope

**Central Area**  
**Vice-Chairman**  
G. J. HAWKEY  
President  
Cleveland Duplex Mach. Co.

## Assistants

JULIAN R. OISHEI  
Procurement Engineer  
Trice Products Corp.  
J. W. KEASTER  
Manager-President  
DoAll Pittsburgh Mach. Co.  
JACOB R. PHILLIPPSEN  
Partner  
Heintz & Philippesen Tool Co.  
WALTER WYATT  
Owner  
Wyatt Sales Co.  
IRWIN B. HAYES  
Electric Auto Lite Co.  
M. L. ALBRECHT  
Gen. Mgr. & Vice-President  
Brehmer Mach. & Tool Co.  
C. E. MONNIER  
Manager  
The Eureka Tool & Die Co.  
DUDLEY B. POLING  
Manager  
Banner Die, Tool &  
Stamping Co.  
JOHN M. DELANEY  
Sales Engineer  
Goddard & Goddard  
MARTIN A. PEARSON  
Owner & President  
Pearson Buttrick Co.

## Western Area

**Vice-Chairman**  
KARL L. BUES  
Mfg. Engineer  
Grove Regulator Co.

**Assistants**  
WM. CAMERON  
Chief Tool Designer  
Ryan Aeronautical  
ANTON PECK  
Special Representative  
Jamison Steel Co.  
KARL L. BUES  
Mfg. Engineer  
Grove Regulator Co.  
AUGUST G. MELDE  
Sup't. Cutter Head Dept.  
Henry Disston & Sons

## Canadian Area

**Vice-Chairman**  
E. N. WEARN  
Sup't.  
Canadian Acme Screw & Gear

## NATIONAL PUBLICITY COMMITTEE

**Chairman**  
J. A. SIEGEL  
Sales Engineer  
A. C. Haberkorn  
Machine Co.

## New England Area

**Vice-Chairman**  
KENNETH F. THOMAS  
District Sales Engineer  
S. K. F. Industries, Inc.

## Assistants

ALBERT T. WARMAN  
Sup't.  
Worcester Taper Pin Co.  
J. H. BULSON  
Sales Engineer  
Edwards & Walker Co.  
ERNEST P. KRIPPENDORF  
Tool Superintendent  
United Shoe Machinery Corp.  
J. A. BRYAN  
Sales Engineer  
Yale & Towne Mfg. Co.  
PHILIP DURLAND  
Equipment Engineer  
Bryant Chucking Grinder Co.  
FRANK A. SHUTE  
Sales Engineer  
A. F. Holden Co.  
JOSEPH M. REDINGER, Jr.  
Works Manager  
Thurston Mfg. Co.

## Middle Atlantic Area

**Vice-Chairman**  
E. C. ADAMS  
Special Washington Rep.  
VanNorman Machine Tool Co.

## Assistants

J. RODNITE  
Machine Tool Lub. Engineer  
D. A. Stuart Oil Co.  
FRANK J. OLIVER  
Machine Tool Editor  
"The Iron Age"  
MARTIN T. BERRY  
Tool Supervisor  
Easy Washer Corp.  
Aviation Division  
J. J. GATTA  
Planning & Wage Rate  
Building No. 28  
General Electric Co.  
E. R. RUSSEL  
Mech. Field Supervisor  
Atlantic Refining Co.  
WILLIAM D. WINGER  
Sup't. Machine Shop  
American Hammered Piston  
Ring Co.

F. J. RAWSON  
Engineering Inspector  
U.S. Nat'l. Bureau of St'ds.  
GEORGE N. MORCEAU  
Chief Tool Engineer  
Hardinge Bros., Inc.  
LYNN L. HALLOCK  
Methods Engineer  
Scintilla Magneto Co.  
W. C. ZWEIER  
Tool & Equip. Procurement  
Engineer  
Lycoming Div., The  
Aviation Corp.  
H. M. BOYER  
Methods Engineer  
York Ice Machinery Co.

## Southern Area

**Vice-Chairman**  
M. M. ROSS  
Sup't. of Tools  
Beech Aircraft Corp.

## Assistants

HAMILL STANSFIELD  
Factory Liaison  
Investigator  
Vultee Aircraft, Inc.  
DAN GREY, Jr.  
Asst. Manager & Partner  
General Machine Co.  
M. D. CARLETON  
Chief Draftsman  
Reed Roller Bit Co.  
ROBERT D. BERTRAM  
Tool Crib Foreman  
North American Aviation  
OTIS WHITE  
Tool Inspector  
Beech Aircraft Corp.

## Middle West Area

**Vice-Chairman**  
WILLIAM IEKEL  
Works Manager  
Republic Drill & Tool Co.

## Assistants

JOSEPH N. HUSER  
Co-Partner  
B & H Specialty Co.  
EDWIN MILLER  
Designer  
Hill & Cope  
FRANK MARTINDALE  
Engineer  
Western Electric Co.  
W. A. AHLBERG  
Machine Shop Foreman  
Brown & Bigelow  
FRED BRUNKA  
Sales Engineer  
Micro Switch Corp.  
KURT J. PAPKE  
President  
K. J. Papke Co.  
STANLEY WELLING  
Tool Engineer  
Modine Mfg. Co.  
HENRY S. FAITH  
Production Engineer  
Giddings & Lewis Machine  
Tool Co.  
TOM BROWN  
Tool Designer  
Reynolds Engineering Co.  
VAN W. JOSLIN  
Supervisor Plant Layout  
Caterpillar Tractor  
DAVID J. HECKINGER  
Sales Engineer  
Vascoloy-Ramel Corp.

## Central Area

**Vice-Chairman**  
LOU WEBER  
Secretary  
Lodge & Shipley Mach. Co.

**Assistants**  
HOWARD K. ROSE  
Sales Representative & Engr.  
Swan Finch Oil Co. Corp.  
J. W. RICHARDS  
Inspector Tools & Gages  
Flannery Bolt Co.  
LOUIS PETZ  
Partner  
Petz & Rabold Tool Co.  
ED. BAUMGARDNER  
Designer  
National Carbon Co.  
GEORGE A. IRWIN  
Super. of Tool & Die Dept.  
Goodyear Aircraft Corp.  
ALBERT HAGE  
Chg. Follow-Up Dept.  
Pur. Tools & Fixtures  
Spicer Mfg. Co.  
FRANK RIPPPL  
Sales Engineer  
A. C. Pletz Co.  
CECIL M. LAUGHTER  
Factory Sup't. & Chief  
Sales Engineer  
Acme Pattern & Tool Co.

## ABLE MEN ARE CHARGED WITH AFFAIRS OF AMERICAN SOCIETY OF TOOL ENGINEERS



Otto Winter, A.S.T.E. president, has been largely responsible for the broad advance of organizational set-up shown in the national committee structure.

Backing him, and facilitating this progress are the national officers shown below. Next to Winter, at left, stand Ray Morris (inset) first vice-president, Douglas Burnside, second vice-president, Frank Crone, treasurer, and Clyde Hause, secretary.

In this picture, they are shown as they took their oath of office at the March meeting in St. Louis.



# A.S.T.E. COMMITTEE STRUCTURE — Continued

**EMERY S. SHROYER**  
Tool Designer  
Curtiss Wright Corp.

**LOYD H. SHEPPARD**  
Production Research Engr.  
Timken Detroit Axle

**THEO. S. VANDERVEEN**  
Engineer  
Kessler Brass Co.

## Western Area

Vice-Chairman  
**ARTHUR J. DENIS**  
Tool Engineer  
Criterion Machine Co.

Assistants  
**HARRY F. BARTLING**  
Tool Designer  
Solar Aircraft Co.

**G. KELTON STEELE**  
Production Engineer  
Production Engineering Co.

**STERLING CLARK**  
Material Unit Chief  
Boeing Aircraft Co.

## Canadian Area

Vice-Chairman  
**R. E. CRAWFORD**  
Editor  
"Canadian Machinery & Mfg. News"

Assistants  
**J. M. WALTON**  
District Sales Manager  
Atlas Steels, Ltd.

**F. A. ROSZEL**  
Sales Engineer  
A. G. Wickman, Ltd.

## NATIONAL MEMBERSHIP COMMITTEE

Chairman  
**W. B. PEIRCE**  
Works Manager  
Flannery Bolt Co.

Vice-Chairman  
**FRANK W. CURTIS**  
Chief Engineer  
Van Norman Machine Tool Co.

Assistants  
**ERNEST F. HENNIS**  
New Eng. Field Engineer  
Heald Machine Co.

**C. L. BOHLIN**  
Foreman  
Saco-Lowell Shops

**W. W. YOUNG**  
Sales Engineer  
Pratt & Whitney Co.

**O. STEVENS**  
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Tool Shop  
Naval Torpedo Station

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Scintilla Magneto Div.

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Lycoming Div.  
Aviation Corp.

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Service Man-Production Dept.  
York Ice Machinery Co.

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To be appointed

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Peerless Mfg. Co.

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**ROBERT T. JONES**  
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Walker Mfg. Co.

**CHAS. BILLBERG**  
Superintendent  
Wisconsin Axle Div.  
The Timken-Detroit Axle Co.

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Deere & Mansur Works

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# PRODUCTION DATA SHEET

## HOURLY PRODUCTION TABLE

(APPROXIMATE)

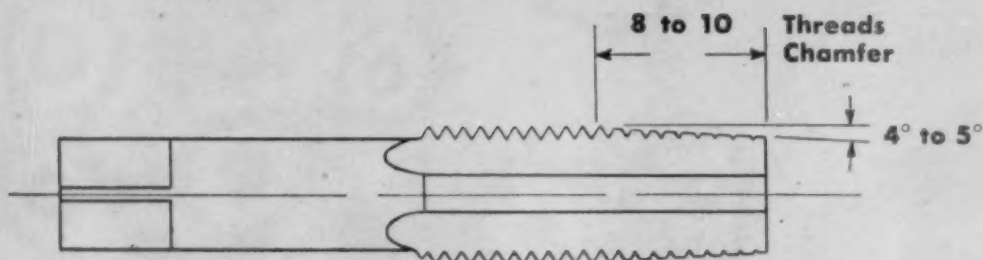
Seconds to make one piece	Gross Production—per hour	Gross Hrs. per 1000 pcs.	Seconds to make one piece	Gross Production—per hour	Gross Hrs. per 1000 pcs.	Seconds to make one piece	Gross Production—per hour	Gross Hrs. per 1000 pcs.
$\frac{1}{2}$	7200	.14	$12\frac{1}{2}$	288	3.47	50	72	13.9
$\frac{5}{8}$	5760	.17	13	276	3.62	52	69	14.5
$\frac{3}{4}$	4800	.21	$13\frac{1}{2}$	267	3.76	54	66	15.0
$\frac{7}{8}$	4114	.24	14	257	3.89	56	64	15.6
1	3600	.28	$14\frac{1}{2}$	248	4.03	58	62	16.1
$1\frac{1}{4}$	2880	.35	15	240	4.17	60	60	16.7
$1\frac{1}{2}$	2400	.42	$15\frac{1}{2}$	232	4.31	62	58	17.2
$1\frac{3}{4}$	2057	.49	16	225	4.44	64	56	17.8
2	1800	.55	$16\frac{1}{2}$	218	4.58	66	54	18.4
$2\frac{1}{4}$	1600	.62	17	212	4.72	68	53	18.9
$2\frac{1}{2}$	1440	.69	$17\frac{1}{2}$	206	4.86	70	51	19.5
$2\frac{3}{4}$	1309	.76	18	200	5.00	72	50	20.0
3	1200	.83	$18\frac{1}{2}$	195	5.14	74	49	20.6
$3\frac{1}{4}$	1107	.90	19	189	5.28	76	47	21.1
$3\frac{1}{2}$	1028	.97	$19\frac{1}{2}$	185	5.42	78	46	21.7
$3\frac{3}{4}$	960	1.04	20	180	5.56	80	45	22.2
4	900	1.11	21	171	5.83	82	44	22.8
$4\frac{1}{4}$	847	1.18	22	164	6.12	84	43	23.3
$4\frac{1}{2}$	800	1.25	23	156	6.40	86	42	23.9
$4\frac{3}{4}$	757	1.32	24	150	6.67	88	41	24.5
5	720	1.39	25	144	6.95	90	40	25.0
$5\frac{1}{4}$	686	1.46	26	138	7.22	92	39	25.5
$5\frac{1}{2}$	654	1.53	27	133	7.50	94	38	26.1
$5\frac{3}{4}$	626	1.60	28	128	7.78	96	37	26.7
6	600	1.67	29	124	8.06	98	37	27.2
$6\frac{1}{4}$	576	1.73	30	120	8.33	100	36	27.8
$6\frac{1}{2}$	553	1.81	31	116	8.62	105	34	29.2
$6\frac{3}{4}$	533	1.87	32	112	8.90	110	33	30.6
7	514	1.94	33	109	9.17	115	31	32.0
$7\frac{1}{4}$	497	2.01	34	106	9.45	120	30	33.3
$7\frac{1}{2}$	480	2.08	35	103	9.73	125	29	34.7
$7\frac{3}{4}$	465	2.15	36	100	10.00	130	28	36.1
8	450	2.22	37	97	10.30	135	27	37.5
$8\frac{1}{4}$	436	2.29	38	95	10.56	140	26	38.9
$8\frac{1}{2}$	423	2.36	39	92	10.83	145	25	40.3
$8\frac{3}{4}$	411	2.43	40	90	11.11	150	24	41.6
9	400	2.50	41	88	11.39	155	23	43.1
$9\frac{1}{4}$	389	2.57	42	86	11.67	160	22	44.4
$9\frac{1}{2}$	379	2.64	43	84	11.94	165	22	45.8
$9\frac{3}{4}$	369	2.71	44	82	12.22	170	21	47.2
10	360	2.78	45	80	12.50	175	21	48.6
$10\frac{1}{2}$	342	2.92	46	78	12.78	180	20	50.0
11	327	3.05	47	77	13.05	185	20	51.4
$11\frac{1}{2}$	313	3.19	48	75	13.34	190	19	52.8
12	300	3.33	49	73	13.61	195	18	54.2

TABLE BY COURTESY OF UNION DRAWN STEEL DIVISION, REPUBLIC STEEL CORPORATION, MASSILLON, OHIO

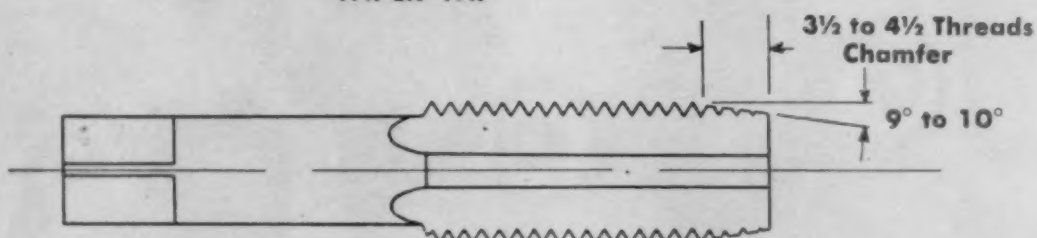


# PRODUCTION DATA SHEET

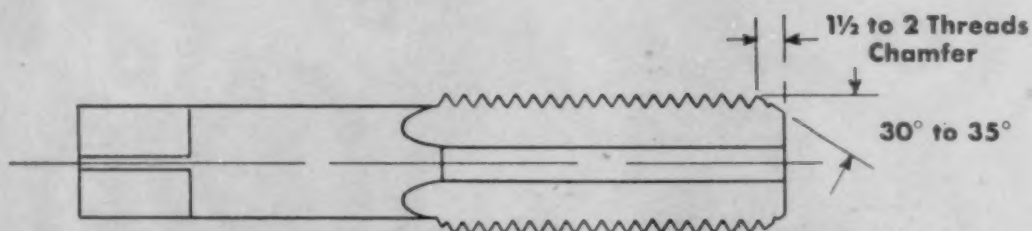
## RECOMMENDED ANGLES FOR TAP CHAMFERS



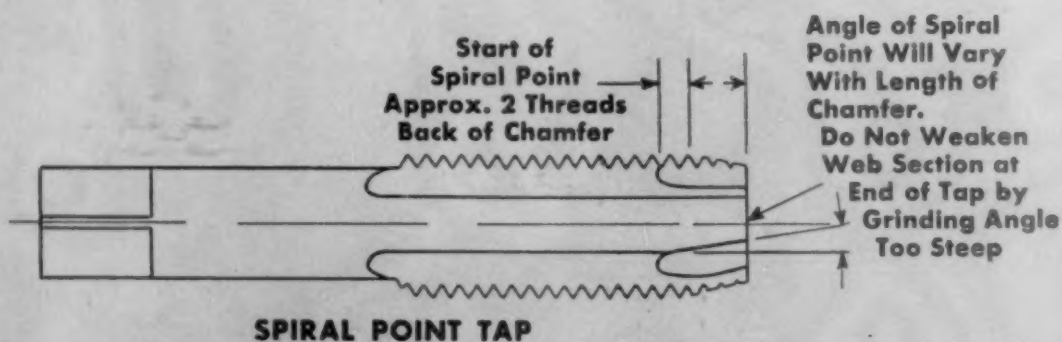
**TAPER TAP**



**PLUG TAP**



**BOTTOMING TAP**



**SPIRAL POINT TAP**

DRAWING BY COURTESY OF DETROIT TAP & TOOL COMPANY, DETROIT, MICHIGAN.

NOTE: On this and the preceding page is the twelfth of a series of Data Sheets to be published in THE TOOL ENGINEER. A handy three ring binder can be secured at any dime store to hold the sheets for quick reference.

THE TOOL ENGINEER FOR OCTOBER, 1942

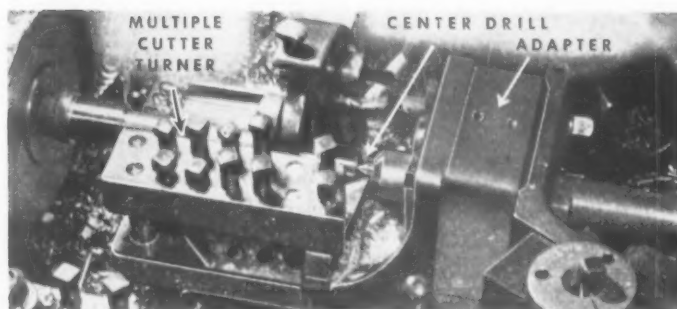
# A Citation for Men in War Industry



## Ideas for VICTORY

—from the Production Lines behind the Firing Lines—

### He Found a Way to Eliminate an Indexing Operation



Two set screws hold the drill holder solidly in the adapter. The rolls of the multiple cutter turner act as a steady support for the bar as the drilling cut progresses.

Turret lathe operator Karl S. Dooley, at the Caterpillar Tractor Co., Peoria, offers an idea particularly valuable to the operator who has all six turret stations full and still requires a center drilling operation to complete the job in one chucking.

The photo shows how a centering tool was rigged up and held in the multiple cutter turner. The center drilling is performed at the same time the last of several finished diameters is turned.

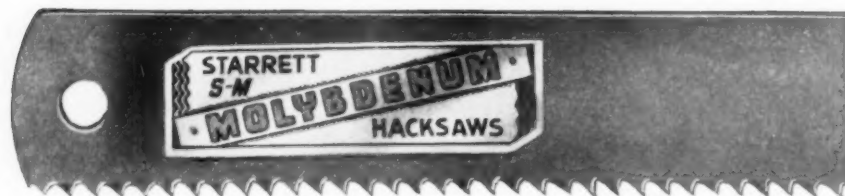
It takes real initiative and ingenuity to work out a time-saving idea like this and we are proud to present operator Dooley with a gold Victory pin for his contribution.

Many practical "Ideas for Victory" sent in by operators are published in "Blue Chips", a shop bulletin sent by Warner & Swasey to the homes of turret lathe operators. Make sure your turret lathe operators and learners are on the list to receive "Blue Chips" Write Warner & Swasey, Cleveland, Ohio.

**WARNER & SWASEY**  
FOR VICTORY

YOU CAN TURN IT BETTER, FASTER, FOR LESS... WITH A WARNER & SWASEY

# How To Get The Most Out Of STARRETT



## HACKSAW BLADES

### DO

**Select** the right blade for the stock. Be sure the length, width, thickness and number of teeth are correct.

**Insert** the blade with the teeth pointing in the direction of the cut.

**Use** recommended speed and feed for metal being cut. Increase pressure at intervals to compensate for blade wear.

**Clamp** the work securely to prevent shifting.

**Use** a cutting compound except for iron castings.

### DON'T

**Don't** try to get good work out of a worn out or poorly adjusted machine.

**Don't** use a heavy blade in a light machine or for small work.

**Don't** over-strain the blade or run it with too little tension.

**Don't** let mounting pins become worn or out-of-round.

**Don't** start a cut with too much pressure.

**Don't** use a new blade to finish a cut started by an old one.

**Don't** waste time and power cutting with a worn out blade.

Starrett S-M Molybdenum Special Alloy High Speed Steel Hacksaw Blades are recommended for the tough, hard-to-cut metals and alloys, and Starrett Tungsten Alloy Blades remain the standard for cutting performance and economy on run-of-mill work. Order a trial supply from your mill supply dealer today.

THE L. S. STARRETT CO • ATHOL • MASSACHUSETTS • U • S • A •

World's Greatest Toolmakers

# STARRETT

PRECISION TOOLS • DIAL INDICATORS • GROUND FLAT STOCK  
HACKSAWS • METAL CUTTING BANDSAWS • STEEL TAPES



# Men, Materials and Machines

## Conversion of Manpower

**Practically, methodically, New England's largest trade school supplies hundreds of men and women monthly to local plants**

**JEROME S. WILFORD**

**I**N 40 to 50 hours, one of the country's largest trade schools at Springfield, Massachusetts, is converting lawyers, insurance men, women from 16 to 60, musicians and department store buyers to useful war production. Once on the job, a number of them are encouraged to return after shop hours for up-grading to replace skilled workers called-up by the draft.

Because job number one is to place men and women on the industrial front at a task where they can contribute to vital output of weapons, the immediate objective is to teach them to operate one machine — such as a lathe or drill press, or to become proficient in using a limited number of gages on inspection. There are no diversions or frills in this type of streamlined education.

The conversion of a major share of energy to this essential task has been a notable accomplishment for the school. Its peace-time program has been amazingly comprehensive. Boys were offered courses in metal work-

ing, printing, commercial art, baking, automobile mechanics; girls were equipped to advance in restaurant, retail store, beauty shop and laundry trades.

In defense training of adults, no attempt is made to establish a broad basis of fundamentals. With the single objective of teaching one job, any gain toward this end is considered a saving of man-hours and material in a war plant. Naturally, the school hopes to keep students until they have become fairly proficient, but they have gone into plants with less than ten hours training. That is considered a gain, and a saving of ten hours of the plant's time in educating green labor.

With defense enrollment running



**Job number one is to place men and women at simple though essential tasks—by teaching them quickly to operate one machine. Once at work, upgrading follows**

**OCTOBER, 1942**

## TAKE AN INVENTORY NOW

MAJOR GENERAL LEWIS B. HERSHEY

**M**ANPOWER is a most important strategic material today. Every employer should make a prompt inventory, appraisal and analysis of the manpower in his own plant as he would inventory his stock pile. To keep production going and at the same time furnish men for the armed forces, industry should now establish an orderly replacement program.

To secure temporary deferments for essential men while he is training women, young men, older men, men physically handicapped or those with a high degree of dependency, the employer should know the fundamental principles in the operation of his local Selective Service Board. He should know how many men on his pay roll are between 20 and 45. He should investigate the classification of every one of those men. On the basis of such an inventory he should plan ahead and train men for replacement of those who must enter the armed forces if we are to have the sort of an army which can win the war.

Deferments granted so that employers may train women or men not liable to early induction, are temporary; they cannot exceed six months and in many cases may be for only thirty, sixty or ninety days. The Army today has to train a bomber pilot within a period of eight months to operate a very technical machine with an instrument board which puzzles an expert. Why, therefore, should industry insist that it assume that it can take two or three years to train men for industrial tasks not nearly so complicated.

Employers may seek deferment of necessary men with or without their consent. Here is how they go about it. On page three of the Selective Service Questionnaire (Form 40) which is sent to each registrant before he is classified is the following: "Instructions—If your employer believes that you are a necessary man in a necessary occupation, it is his duty to fill out Form 42a requesting your deferment. You may also attach to this page any further statement by yourself which you think the local board should consider in determining your classification."

This is on all questionnaires distributed during the past six months. If such a request should be denied, the local board will send the employer at the same time it notifies the registrant of his classification, a Form 59. There are ten days after Form 59 is mailed to the employer during which he can appeal the registrant's case.

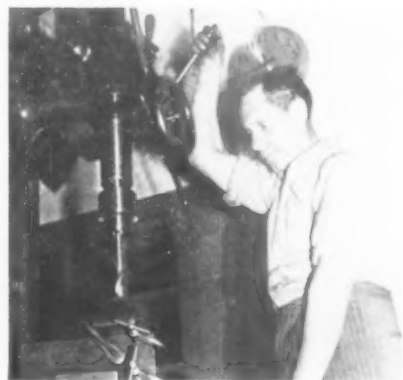
In order to take an appeal, the employer simply has to sign his name to Form 59 which he has received, and return it to the local board; or in case the form is not received, any written request will make the appeal procedure automatic. If the local board and the appeal board deny deferment, the employer may then bring the matter to the attention of the State Director with the request that the case be reopened or appealed by him to the President.

A double duty rests upon the employer. He should personally know his manpower situation. The employer who delegates the task of filing a request for deferment to a clerk, the executive who does not make a complete inventory today, is negligent. The employer engaged in essential war production who has been required to greatly expand his plant and who then fails to request deferment for key men is also negligent.

There are only sixty million people in this country capable of effective productive effort. They must do everything from farm to plant to fighting on foreign shores. When we hear of the big armies we are going to raise, we must all remember that it takes at least five men or women to produce what they eat, use, fight with, and wear.

over the 1200 mark — nearly equaling the regular registration of day school students in the complete trade courses — about 400 persons a month are being placed in local plants. Of this total enrollment, 30 percent of the students are already on defense plant payrolls, being up-graded to more skilled work.

With the essential purpose being to supply production workers, two factors guide the school — the needs of industry for particular types of workers and the aptitude of the individual



**This day laborer is qualifying for a better job in a defense plant, learning to operate a drill press at the Trade School**

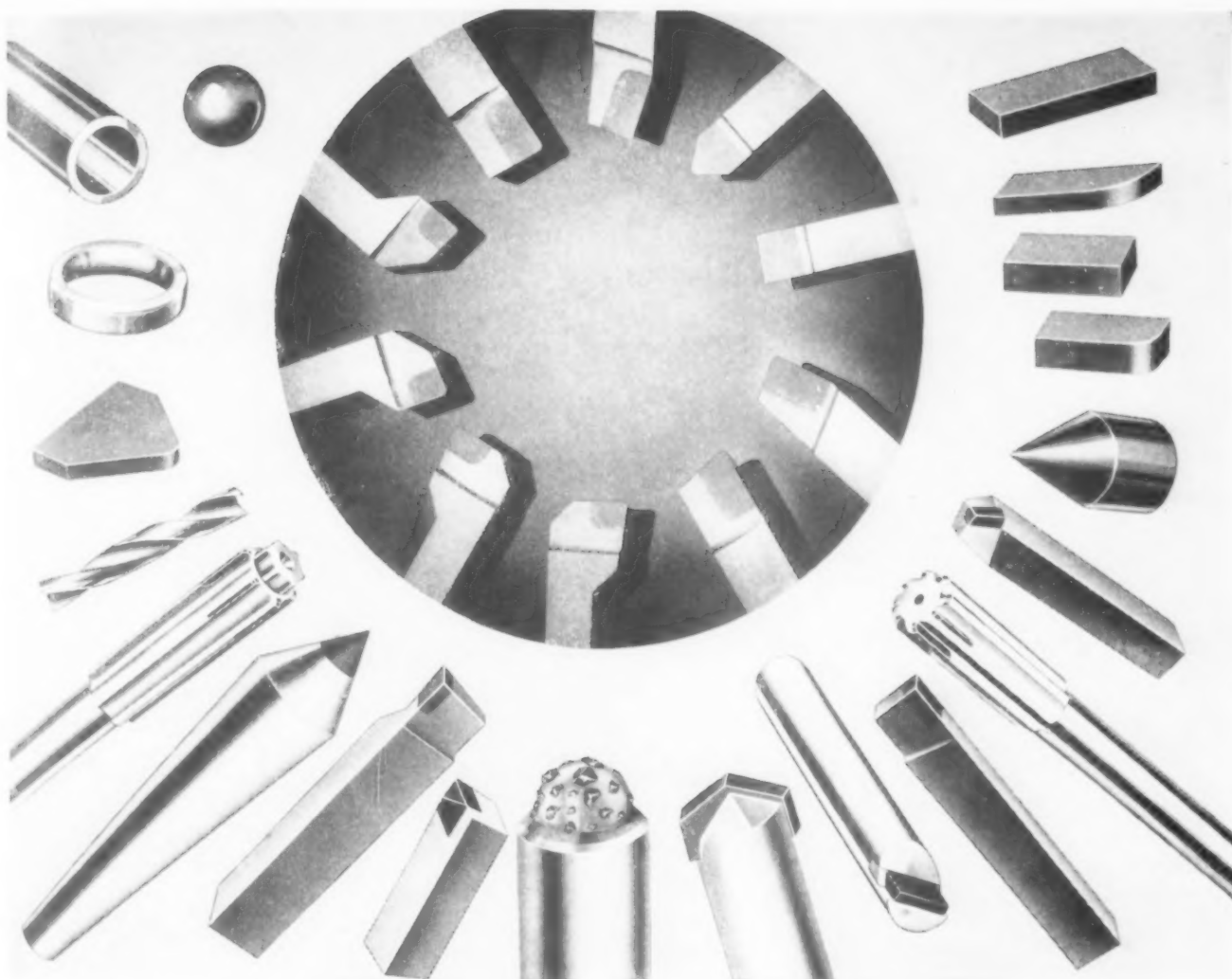
students. Industry's needs are judged by the calls which come from different companies for drill press, lathe, hand miller operators, assembly hands or inspectors.

Workers can be supplied for these occupations quickly. They know how to run a machine and they have been orientated to shop work. At one time, before the pressure for labor was as great as today, but when the school first recognized the need for skilled defense labor, as many as 400 hours of training were given a student. Along with actual shop work, they received related study in shop theory. Today, about an hour a week is devoted to the most elemental consideration of shop mathematics, blueprint reading and micrometers.

### **Saving Time on the Job**

One of the things which some students have to overcome is a degree of fear of machinery, and at the same time they must learn the proper precautionary measures which mean plant safety. These bugbears to education on the job are saved the defense plant.

For the defense emergency, the  
(Continued on page 109)



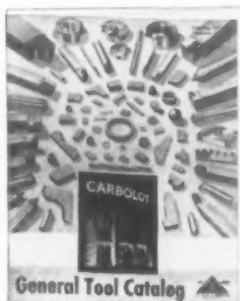
## ANNOUNCING—NEW, STOCK-TOOLS AND BLANKS plus NEW, TIME-SAVING STANDARDIZED DESIGNS!

Carboloy Company now makes available (effective Sept. 8) a large number of additional **STANDARDIZED** tools and blanks, to supplement its present standard boring, facing and turning line.

These newly standardized tools and blanks fall into two classifications as follows:

**1. Standard STOCK.** Standard stock items are those manufactured in mass production and maintained in stock for immediate requirements. With the additional standards established, over 200 separate items are now in this standard stock classification.

**2. Standardized Designs.** Standardized-design items, in general, are former special tool styles for which



there previously has been a large demand *within a narrow range of minor design variations*. Standard designs for these have been established to broadly meet most previous requirements. You can now order these items simply by tool number and eliminate considerable time for drafting, blueprints, quotations, detailed ordering etc. Standardized design items will be added to stock as demand justifies.

A new 28-page general tool catalog, No. GT-142, contains complete prices and specifications. Copies on request.

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11145 E. 8 MILE AVE., DETROIT, MICHIGAN

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Toronto, Canada

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TOOLS • DIES • DRESSERS  
CORE BITS • MASONRY DRILLS  
• WEAR RESISTANT PARTS •

CARBIDES

FOR THE MANUFACTURING • MINING • TRANSPORTATION • CONSTRUCTION INDUSTRIES





ing tool to form-cut groove on motor gear housing.



Large diameter tool for rough and finish boring and chamfering end of crank case.



Slide action tool to cut face after clearing obstruction in casting.



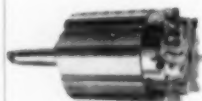
Slide action tool for rough and finish boring, chamfering and facing rear end of crank case.



Carboly tipped boring tool for machining bearing seats.



Reverse action tool to turn hub for gear clearance.



6-inch diameter facing tool equipped with removable Carboly tipped blades.



Tool equipped with ball bearing, micrometer adjustment boring, facing and chamfering bits.



Combination Core Drill and finishing tool for use on engine block.



Tool for facing ends of cylinder bores after they are mounted in motor block.



Centric facing tool for machining the boss thru eccentric opening.



Reaming tool for cutting snap-ring groove in gear assembly.



Slide action tool to rough and finish bore, chamfer, and face reduction gear housing.

# PRODUCTION SPEEDS UP *with* **Carboly** TIPPED TOOLS

The illustrations show a few of the many High Production Tools designed and built by Scully-Jones & Company for producing aircraft engines. Carboly tipped cutting edges assure maximum efficiency in performance as well as increased production through greater speeds and feeds.

Our Engineering Staff is ready to assist in solving your production tooling problems.

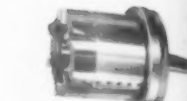


## SCULLY-JONES & CO.

1901 SOUTH ROCKWELL STREET  
CHICAGO • ILLINOIS



Slide action tool for finish boring rear end of motor crank case.



Facing tool with adjustable blades having staggered Carboly tips.



Recessing tool for machining grooves for packing rings.



Hollow Mill equipped with adjustable Carboly tipped blades.



Two step facing tool equipped with adjustable stop and Carboly tipped blades.



Three chamfering cut made in one time on airplane motor using this automatic tool.



For machining, at one time, both of outer bearing in camshaft tool.



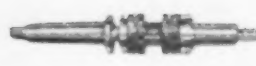
Automatic facing tool for machining internal bore.



Boring tool with micrometer adjustment for use on distributor gear housing.



Automatic tool for cutting recess and two chamfers in supercharger part.



Recessing tool for cutting double groove in oil line part.



Above—Springfield mother has sons in service, learns to operate a lathe. Below—Baker, milkman and boxmaker prepare to take their places in defense plant



school developed new shops in grinding and lathe work. In the latter, engine, turret and automatic machines have been set up.

Though workers with any degree of training are highly valuable today, Springfield Trade School is not spending equally valuable metal on education alone. Shop students are turning out bench vises which have been shipped to plants all over the country. Even more valuable, bench plates are being scraped and put in use on production. Scraper hands, of course, are not being taught in 40 hours. Something more than two months of fairly intensive training is required, but its worth is based on the dire shortage of men to do this necessary work.

The Springfield school, largest in New England, was started in 1909. It has grown steadily with the constant aim to meet the educational needs of the community. It has been given impetus by such research as that which showed that less than two percent of the inmates in the state penitentiary had trade experience. Another factor in advancing it to this stage of a five building plant was its effort to rehabilitate welfare recipients. This training job has paid dividends, with nearly all of these adult students at work in the local plants today.

Today's job is not one of rehabilitation, but it has some of the basic idea of taking adults who have gained a livelihood at one occupation, and

training them for something totally different. Probably, today's conversion offers a greater gap to bridge.

Among recent students have been more than three score lawyers and an insurance salesman who has written more than a million dollars in policies. A commercial artist who started school in May, went to work in a defense plant in June, is now a foreman over a milling machine department. A local department store buyer is a top inspector. An automobile salesman has qualified as a cutter grinder.

#### Forty Percent Women

Forty per cent of the students are women, and their number is increasing. Housewives, army widows — and grandmothers — are enrolled. A mother of a girl ferrying bombers across the Atlantic and a son in the RAF is taking night shop training.

Recognition of the job which the school is doing is shown in the contribution of local industry in the way of machinery for its shops and in the hiring of its product. One local plant, a division of a national organization is now maintaining on its payroll about fifteen women who are receiving advanced instruction in shop work. They are punching company time cards at the school. The company is assured of their availability when needed to replace Army draftees or to meet expanded production schedules.



#### NOTED ARTIST TURNS TO LATHE BUILDING

As at Springfield Trade School, where a nationally famous wood-cutter, Asa Sheffetz, is learning shop work, the Lodge & Shipley Machine Tool Company in Cincinnati has employed a noted painter. Fred Springer, shown on the right, one of Cincinnati's fine artists, has turned from his canvas and murals to war production of lathes for use by the United Nations at the four corners of the earth. Springer, a graduate of the Cincinnati Art Academy, has executed many prominent mural assignments, including those of the new Cincinnati Post Office building.

A panel designed by Springer, showing a lathe at work, the chips from the lathe breaking up the swastika and the Rising Sun, is being used by Lodge & Shipley in its war morale program. Shown with Springer in the photograph on the left is Harry Achille, a co-worker at the plant.

This is one more example of the hundreds and thousands of men and women who are leaving their regular occupations, often sacrificing lifetime objectives, to their war effort.

## ON THE SPOT WITH A PRODUCTION PROBLEM?



... SEND A WIRE TO THE  
EMERGENCY PRODUCTION SERVICE  
DEPT. OF KEARNEY & TRECKER



Getting the tools to do the work is often more of a problem than the production job itself. Sometimes it just gets down to having the *know how* to use present equipment or merely adding a standard attachment which adapts or converts an existing milling machine in your plant to a particular operation.

When you are on the spot with a difficult milling job the Emergency Production Service Department of Kearney & Trecker Corporation is at your service. They have the *know how* to be able to suggest getting the most in performance from your present Milwaukee milling machines ... to extend their range of application and usefulness with standard attachments and accessories.

Kearney & Trecker believes that their Emergency Production Service can help you just as it has helped others faced with production problems. To avail yourself of it all you need to do is pick up your telephone and send a wire, stating your problem, to this Department. Immediately upon receiving your wire, arrangements will be made to have a trained field representative contact you at once. Depending upon the nature of your problem he will provide you with complete technical information or call directly at your plant.

The Emergency Production Service Department of Kearney & Trecker is maintained for your benefit—to aid you in your war effort. We urge you to make use of it.

Here is an exceedingly versatile attachment that should be put to work in your plant — to relieve machine shortage — to avoid the difficulties of getting new machines — to add to the range and usefulness of your present Milwaukee Milling Machines.

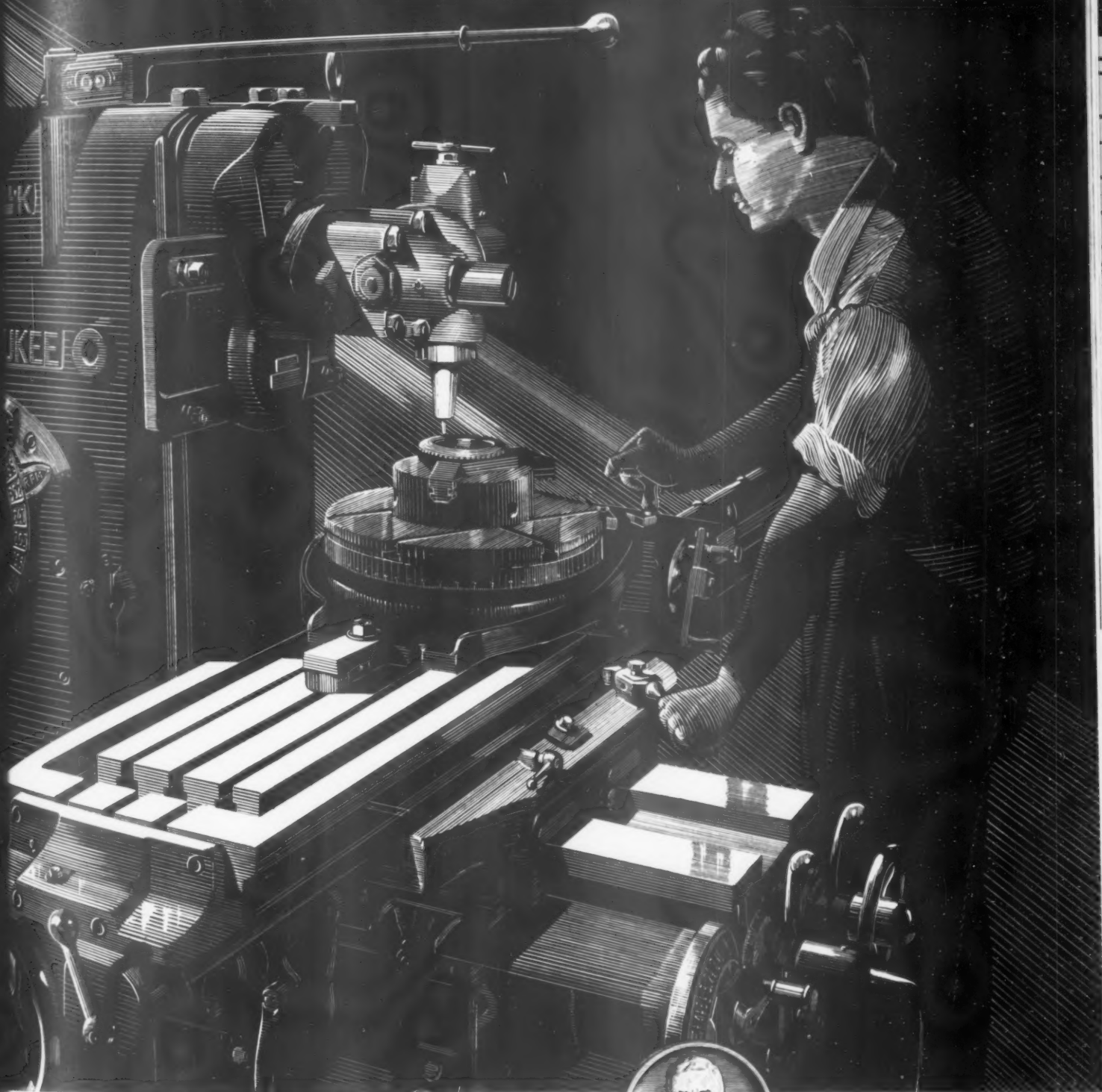
It's the Standard High-Speed Adjustable Universal Milling Attachment, shown above in use in conjunction

with a low lead attachment and rotary table for end milling a scroll. This is but one of many applications of this versatile tool, such as milling on dies, metal patterns, templets, T-slots, dovetails and other milling operations. When used with a rotary table, circular milling operations can be performed. When used with a dividing head with lead attachment spiral milling operations can be accurately and rapidly performed.

# Milwaukee M A C H I N E



# THIS ATTACHMENT PINCH-HITS ON MANY PRODUCTION JOBS...



Look into this and many other Milwaukee milling attachments—to help solve particular milling problems—to break production bottlenecks—to extend the use and range of application of your present Milwaukee Milling Machines. Write for the complete file of literature on Milwaukee milling attachments.

KEARNEY & TRECKER CORPORATION  
MILWAUKEE, WISCONSIN



*Kearney & Trecker offers a complete file of bulletins and technical literature including the "Right and Wrong of Milling Practice"—an illustrated handbook showing right and wrong methods of milling—full of practical advice that will aid your men to become better milling machine operators. Write Department C for your copy.*

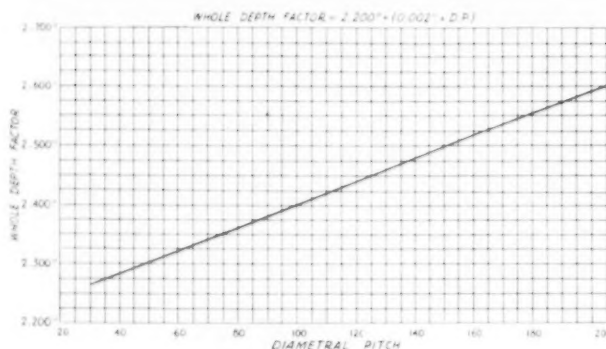
**KEARNEY & TRECKER**  
CORPORATION

E T O O L S

## FINE PITCH GEAR CHART REVISED

The American Gear Manufacturers Association revises here one of the charts it supplied for Tool Engineer Magazine's feature last month on "Clearances for Fine Pitch Gears."

The Editors suggest this chart be pasted over the upper one on page 77, Sept. issue.



**HOW MUCH  
CAN GOOD CUTTING OIL  
SERVICE HELP YOU?**



RECENTLY, before an important audience, two eminent machine tool authorities stated that the intelligent study of cutting oil application may offer as much as 30% production improvement in many plants. There are indisputable facts behind that statement!

Cutting oil application should not be a matter of "guess and hope" or habit. It need not be; for there are Stuart Oil Engineers, specialists of broad experience, skilled in solving cutting oil application problems, ready to help you.\*

\*The Metals Exposition is a good place to start your cutting oil study. Stop in at Booth C-310.

**Stuart's  
CODOL**  
LIQUID GRINDING COMPOUND

**Stuart's  
"SUPER-KOOL"**  
AMERICA'S FIRST TRANSPARENT SULPHURIZED  
CUTTING AND DRAWING OIL

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HEAVY DUTY CUTTING OIL

**Stuart's  
SOLVOL**  
LIQUID CUTTING COMPOUND

For All Cutting Fluid Problems

**D. A. STUART OIL CO.**

Chicago, U.S.A.

LIMITED

Est. 1865

Warehouses in All Principal Metal Working Centers

## Metal Congress October 12-16

250 Manufacturers to Display  
in Cleveland's Auditorium

The National Metal Congress and War Production Edition of the National Metal Exposition will be held in Cleveland's Public Auditorium, October 12 through 16.

Keynote of the Show this year will be education devoted exclusively to increasing production of war products. The technical talent of four co-operating societies, and engineering experts of some 250 manufacturers are being mobilized to help the metal industry do more with what it already has, to marshal ideas and improved production methods that will help win the war of metals.

Displays are expected to fill some 200,000 square feet of floor space in the big auditorium at the lake-side city.

### Production Sessions

Among attractions at the meeting will be 25 American Society of Metals War Production Sessions. Outstanding authorities in government and industry will speak briefly, informally and off-the-record on important phases of these topics. All speakers will later act as members of an information panel for open discussion.

It is believed that these sessions will be practical, operating on a give-and-take basis with metal men getting answers to their problems.

These sessions will be augmented by technical sessions of cooperating societies. They will be held every afternoon and the first three evenings in meeting rooms of the auditorium.

### Displays

The auditorium will also house displays by numerous manufacturers. These companies will have technical and engineering men manning educational conference displays, it is said. In addition, government agencies have arranged to be represented in conference displays.

It is believed that a highlight of the show will be the presentation of some 100 technical papers at regular sessions of the cooperating societies.

## Companies Find Two Scrap Sources, Materials Substitutes Offered



**MOUNTAIN OF SCRAP**

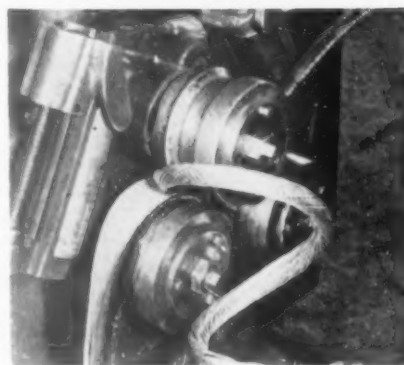
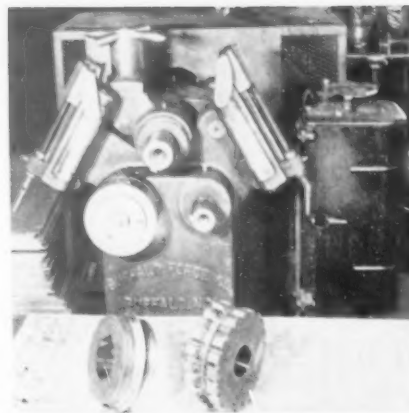
Typical cleanup of obsolete machinery in the plant of Koven & Brother, Jersey City, yielded 579,770 pounds of metal. Also scrapped were 60,000 pounds of rivets, "needed more now than for after-war use." To meet vital steel production, 17,000,000 tons of scrap must be collected by December 31.

### STANDARD BENDING ROLL MACHINE SALVAGES RUBBER

SEEKING a method of salvaging rubber insulation from scrap electric cable, The Timken Roller Bearing Company experimented with a standard Buffalo bending roll machine. This consists of three smooth wheels, two of which are in tandem beneath a third wheel centered above them. Varying pressures are exerted upon the material to be bent by raising or lowering the upper wheel.

One lower wheel was removed and replaced with a notched gripper wheel. A sharp center-flanged wheel replaced the upper wheel. No change was made in the third wheel. The gripper wheel feeds the cable between the flanged cutter wheel and the pressure wheel, slicing the cable open and peeling it simultaneously. The cloth cable cover drops free from the inner layer of fine rubber.

Feed is at about six feet per min-



ute. Cables ranging in size from  $\frac{5}{8}$ -inch to two inches are handled. This machine is converted to salvage use in about three minutes.

## Plastic Useful in Repairing Patterns



"Celastic", which has made shoe toes strong and resilient, affords quick repairs on foundry patterns. Double-napped cotton flannel, impregnated with cellulose nitrate and fire retardant—solvent makes it shape easily. Dry surface allows light sanding, shellac. Discarded patterns have been renewed for 200 castings.

OCTOBER, 1942

### SILVER BRAZING PREVENTS WARP

Part of the mechanism controlling big guns and their turrets are two-inch solenoid cores wound on a lightweight, all brass spool. The end-piece of the spool is permanently joined to



Arrow points to silver alloy brazing.

a tube by a silver brazing alloy. Distortion is prevented because of the low brazing point of the silver alloy — 1175 degrees Fahrenheit.



# Facing Facts in Employee Relations

**RALPH L. LEE**  
GENERAL MOTORS CORPORATION

SOME time ago a thief broke into one of Detroit's largest tool and die shops and got away with an armload of micrometers, vernier height gauges and other precision measuring instruments. The shop shut down and couldn't get going again until friend-

ly competitors loaned some of their overworked instruments.

In thinking over this incident and the fact that this tool and die shop was vital to our local defense activities it suddenly dawned on me that this present mechanized warfare now involving most of the civilized world was, in reality, being fought with instruments with which to get unbiased facts regarding the materials, tools

and procedures involved in the quantity production of munitions.

However, in spite of all our accurate facts regarding the physical or material elements which enter into the conduct of modern American industry, we are still forced to use the long discarded, pre-mike cut-and-try, personal opinion methods for dealing with the most important industrial element of all — the human element.

While it is a pity that we do not have a "humanometer" or a handbook of accurate human relations facts and formulas comparable to our machinery, electrical, chemical or other technical hand books, I can't help but feel that there must be a few dependable facts scattered around in the minds of successful factory managers, personnel men, supervisors and foremen.

So, playing this hunch, I have started a fact pool into which I am asking the successful factory supervisors I meet on my travels to toss any leadership facts they feel they can spare.

While I haven't had time to even count the facts my fact pool already contains let alone evaluate or classify them, I have found many exactly alike.

**FACT NO. 1 — EVERYONE IS DIFFERENT AND THE ONLY ONE OF HIS KIND.** So far, I have met no one who questions this fact. Most shops contain the following types of people:

**THE BULLY** — who tries to force himself into a position he has not earned or is capable of holding. **THE SMOOTHY** — who tries to finagle his way into the same spot. **THE CLOWN** — who insists upon attention, whether favorable or not. **THE SMART ALEC**, **THE BLUFF**, **CRY BABY**, **TATTLE TALE**, **POUTER**, **THE TROUBLE MAKER**, **THE PEACE MAKER**, **THE STRING SAVER**, **THE SPENDTHRIFT**, **THE GAMBLER**, **THE PLAY SAFER**, **FUSS BUDGET** AND **SCATTERBRAIN**. Also the chatter box, the sphinx, itchy fingers, jack rabbit and snail; **PREVARICATORS** in the kinder sense of the word, the **THINKER-UPPERS** who rarely can lead, and the **LEADERS** who rarely are creative. The natural born stock keepers and accountants, and, thank God, the normal

*What Is Your*  
**WAR  
PRODUCTION  
PROBLEM?**

**Let Us  
RELIEVE YOU  
of the Job!**

**I**F you're at a stalemate on your war production contracts, due perhaps to unfamiliarity with certain phases of the work, shoulder on us the burden of taking out the kinks. Regardless of how big or how little the job on which you need assistance, our engineering staff is at your service.

**Is It One  
of These . ?**

- Plant Conversion . . .
- Increasing Production
- Cost Estimates . . .
- Process Engineering
- Designing Jigs, Tools
- Fixtures, Gages, Dies
- and Special Machines

## **Specialists In Industrial Engineering Service**

With a force of over 100 industrial engineers, serving leading manufacturers in the war industry from coast to coast, we are in a position to take care of your needs promptly and dependably.

**WRITE** for quotation on the type of services in which you are interested. No job too large or too small.

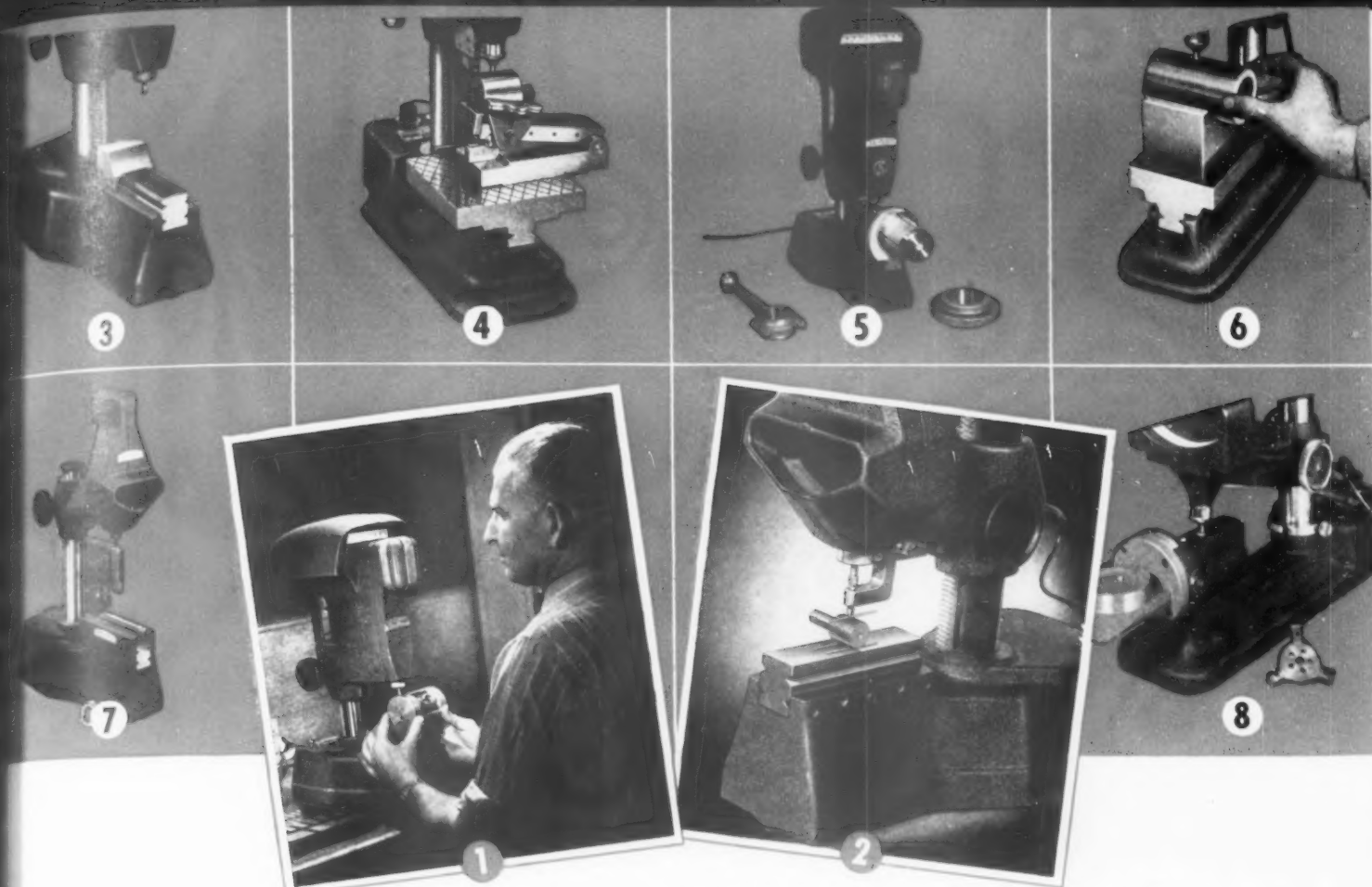


*American*  
**Designing & Engineering Co.**



1209 WASHINGTON BOULEVARD

DETROIT.. MICHIGAN



# ARE YOU GETTING *Maximum Service*

## FROM YOUR VISUAL GAGES?

**1** Equipped with plain and serrated anvil for the checking of width, thickness, height, or outside diameter.

**2** Equipped with flat anvil and thread wire attachment for checking pitch diameter of screw threads.

**3** Equipped with standard backstop for accurate and rapid positioning of work being gaged.

**4** Equipped with wide anvil and Sheffield sine bar fixture for the checking of tapers.

**5** Equipped with Sheffield Internalgage for the checking of inside diameter, taper, and out-of-round.

**6** Equipped with wide anvil and V-block for checking outside diameter of cylinders and bushings.

**7** Equipped with fixture to check ball diameter of an inner ball race.

**8** Internalgage with fixture to check a depth.

The Sheffield Visual Gage is used for many purposes. If you are not familiar with all of them, the outline here may suggest a means of increasing the effectiveness of your gages and the variety of work they do. Sheffield Visual Gages are used:

### *In the Inspection Department*

For the final inspection of close tolerance manufactured parts.

For the classification of such parts as the basis for selective assembly.

### *In the Tool Room*

To check fixed size gages for wear.

To check precision gage blocks for wear.

To check the dimensional accuracy of tools.

### *In the Production Shop*

To provide machine operators with an accurate check on work in process.

### *In the Receiving Department*

To check dimensional accuracy of purchased parts and sub-assemblies on arrival.

### *In the Laboratory*

To provide maximum accuracy for measurements of all kinds.

THE **SHEFFIELD**  
CORPORATION  
DAYTON, OHIO, U. S. A.



(Continued from page 114)

**SALT OF THE EARTH** in a majority who can always be depended upon to go more than half way in any worth-while direction.

The thought occurs to me that we might compare the different human materials of which our departments and organizations are composed with the materials we use in our work.

We know that a drill ground to go to town on a steel casting would certainly play hob if turned loose on our brass castings.

By exactly the same token, we know that we cannot possibly use the human material in our organization stock unless we get acquainted with it to a point where we know exactly what each type is.

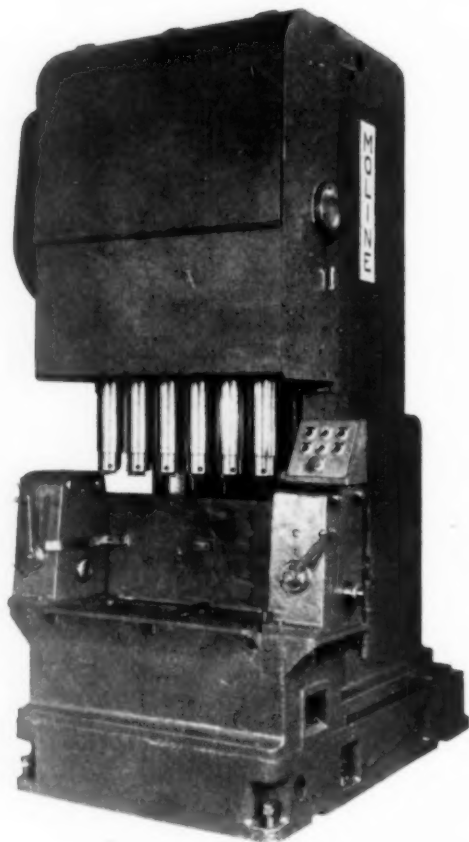
**FACT NO. 2 — MOST PEOPLE ARE WHAT THEY ARE BECAUSE THEY CAN'T CHANGE OR BE CHANGED MUCH.**

The difference between cast grey iron and high speed steel is great, and yet, as great as it is, it is limited by the basic characteristics of iron. No

matter what you do to iron, you can't make it into brass or aluminum. Again, and to a marked degree, we have a parallel in the human materials we deal with. I am afraid that some of our employe relations difficulties can be traced to supervisors who approach their employes as though all of them could make themselves over.

**FACT NO. 3 — NO ONE INDIVIDUAL IS THE SAME ALL THE TIME.** Unless we know the condition of a given piece of steel we can't use it effectively. Has it been hardened? The temper drawn? How far? Or has it been annealed? How hot was the grey iron poured? Is the brass brittle from overwork? Or has it been annealed? In other words, what is the condition of the materials we have to deal with.

## On the Industrial Front



Moline No. 116FB Precision Boring Machines on the industrial front finish bore the cylinders of internal combustion engines so that our armed forces on the fighting front will have plenty of high quality power driven equipment.

## MOLINE TOOL COMPANY

Moline, Illinois

"Holehog"

Established 1901

116

### After the Night Before

A slap on the back with a "Hi, you big so and so" might bring a "What's it to you?" in the best of spirit and good will under certain conditions. But the same approach to the same individual at another time when his only child is not expected to pull through would be entirely out of order. The first day back after a siege of sickness is no time to jack a fellow up.

**FACT NO. 4 — EVERYONE IS PROUD OF BEING DIFFERENT.** In spite of societies, associations, orders, organizations and unions, the members of all groups are fundamentally and incurably individualists.

I am convinced that equal to our need for food is our need to have the differences which separate us from our fellows recognized and taken into consideration by those we live and work with, but, primarily, by those we work for.

While we have barely scratched the surface of our fact pool I think you will agree that the facts or near facts we have examined, so far, might well be faced.

Doing this, it becomes apparent that employe relations in any department or industrial institution can never be more or less than **THE SUM OF THE PERSON-TO-PERSON RELATIONSHIPS EXISTING BETWEEN EACH AND EVERY EMPLOYEE AND THE COMPANY PEOPLE HE DEALS WITH.**

THE END

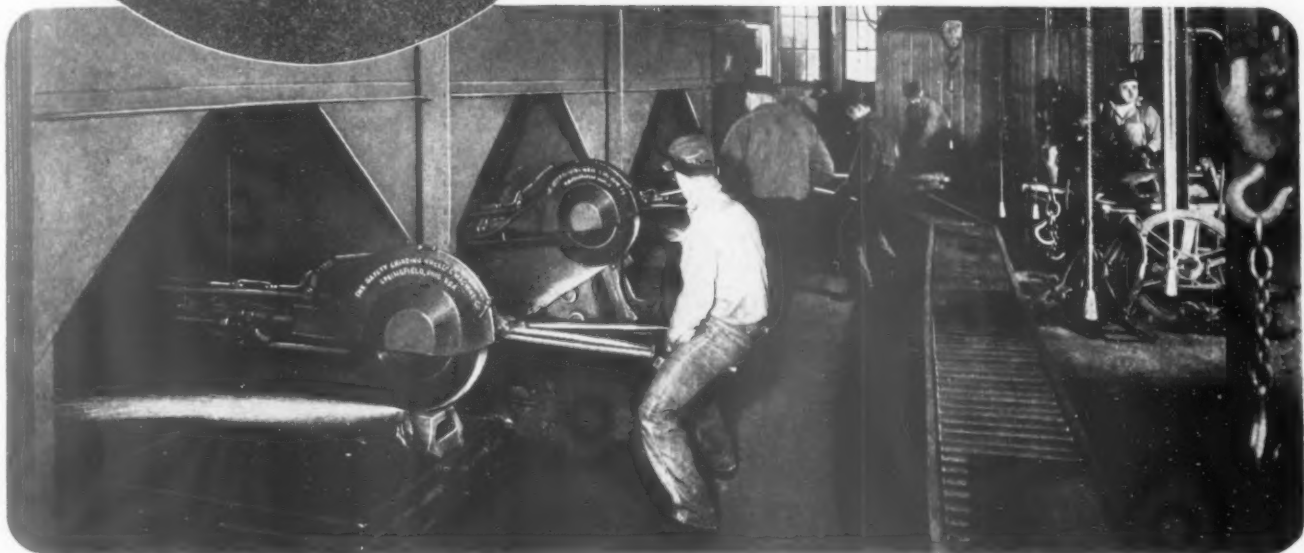
THE TOOL ENGINEER



# SAFETY

# GRINDING WHEELS

AND SWING  
FRAME GRINDERS  
MAKE GOOD TEAMMATES  
FOR FASTER, SAFER  
SNAGGING



SAFETY GRINDING WHEELS and SAFETY DE LUXE SWING FRAME GRINDERS are teaming together in war factories, foundries and shops all over the country, speeding up production, doing a faster, safer job of snagging. For example: We helped one of the nation's largest manufacturers of airplane propellers increase production and simplify operations by means of the SAFETY Swing Frame Grinder. Let a SAFETY Sales Engineer — a man experienced in grinding production problems—show you how SAFETY Grinding Wheels teamed with SAFETY Swing Frame Grinders or SAFETY Floor Stand grinding equipment can help you speed up your production. There's no obligation. We can assure prompt delivery on wheels and equipment.

FOR PROMPT DELIVERY AND ADVICE ON YOUR GRINDING PROBLEMS, PHONE THE NEAREST "SAFETY" SALES OFFICE LISTED BELOW, OR WRITE TO THE FACTORY DIRECT.



## THE SAFETY GRINDING WHEEL & MACHINE CO.

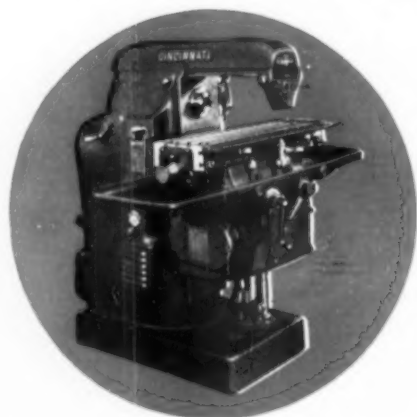
Main Office and Factory SPRINGFIELD, OHIO, Phone 4651

● SALES OFFICE ★ SALES OFFICE and WAREHOUSE

● Birmingham—3-3323 ★ Chicago—BRUNSWICK 2000 ★ Cleveland—CEDAR 9292 ★ Detroit—TOWNSEND 8-4740  
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★ Syracuse—2-2191 ● Milwaukee—BLUEMOUND 0742



## TWO FIXTURES ON THE MACHINE GIVE IT *Two-fisted* PRODUCTIVE CAPACITY



● CINCINNATI No. 1-18 Plain Automatic Milling Machine. Equipment includes Automatic Spindle Stop and Automatic Backlash Eliminator. Circular No. M-848.



By the simple expedient of adding another fixture, production obtained from milling machines can often be increased a worthwhile amount. Knowing the cutting time (X) and loading and unloading time (Y) the desirability of an additional fixture can readily be determined . . . the greatest production increase will be realized in those cases where X and Y are approximately equal.

*The illustration above shows how this idea has been applied to a CINCINNATI No. 1-18 Plain Automatic Milling Machine. It is equipped with two fixtures for milling the sides of bosses on connecting rods. The cutting time happens to be longer than the loading and unloading time, but more important, the machine is cutting continuously, and production is at a maximum.*

Like many other CINCINNATI Milling Machines the No. 1-18 Plain Automatics are well adapted to two-fixture milling. The circular for these machines, No. M-848 brings out the possibilities for this type of work in your shop.

THE CINCINNATI MILLING MACHINE CO. CINCINNATI, OHIO, U.S.A.  
TOOL ROOM AND MANUFACTURING MILLING MACHINES... SURFACE BROACHING MACHINES... DIE SINKING MACHINES

# PRODUCTION PERSPECTIVES...

News Review of Mass Manufacturing



## PRODUCTION FLASHES:

How long will war production last? President Roosevelt guessed 3½ years. FDR and WPB Chief Nelson both insist industry has reached only 50 per cent of capacity. All-time peak in U. S. production was reached in September. Nelson sees full-flow starting in January-February.

Production bright spot: Shipbuilding. All records were broken Labor Day when 174 vessels were launched, keels for 49 were laid. Shipyard workers have increased their output more than 12½ per cent since January.

Machine tool production in the last 12 months equalled the previous 10 years. Typical reason: The Dodge Motor airplane engine plant a-building at Chicago is requiring 6,000 machine tools.

Size of war production program may be judged by appropriations and authorizations. They now total \$220,000,000,000—more than all monies spent by the government from its founding to Pearl Harbor.

Steelmen continue to set a killing pace. Production last month was at 98 per cent capacity. Manpower is a big worry. The industry still on an eight hour day, says it's either a 10-hour day or less steel....soon.

More than 75 per cent of U. S. monthly steel output of 5,300,000 tons is going into direct war work, the remainder into essentials -- railroads, machine tools.

Material shortages: Worst is scrap. Steel industry is now consuming 4,800,000 tons monthly, four times 1938 rate. The problem has reached FDR's desk. If public doesn't gather more, he says, government will take it away from owners. This may happen before winter's out.

Engineers wondered how Construction Wizard Henry Kaiser could build his 60-ton flying box cars without drawing on vital metal reserves. Answer: More than 50 per cent of each plane will be plywood and plastic.

Expected soon is standardization of remaining civilian production, closing of plants not on war work. Despite its ballyhoo, the government has failed at getting war jobs into small shops. Good example of how industry has gone at this task is the auto manufacturer's subcontracting on major war projects to 1,000 small plants.

Appointment of General Electric's C. E. Wilson to supervise production: Industrialists point to success of World War One's six major administrators. A Rubber Administrator has been named. Watch for one over steel.

How industry is doing the job: One airplane engine manufacturer told us they sometimes "spot materials....ask the government if it's OK to take them....fly them to the plant in the morning, ship the finished product that afternoon."

Manpower is industry's most serious problem. WPB as well as Selective Service is now after men. Drafting labor, speeded by freezing western mining and lumber workers to their jobs, is not far off.

Draft Chief Hershey says industry is going to be "shocked" into realizing that many men can be replaced, that more women must be utilized. Women Workers: Need for 5,000,000 more is seen. Some 4,500,000 will be at work by January. Plans call for women at every third machine.

Trend in draft departments may be set with Henry Ford's workers. Out of thousands of deferment requests at his Willow Run Bomber Plant, only 72 have been denied. Voluntary enlistments is problem there, however. About 6,000 have "joined up." Management is considering asking Army to put all Ford Plants on a "blanket deferment basis" to prevent such losses for duration.



## Trends

Before second front battles can be fought, production front battles must be won. One of the biggest battles now being fought is the building of ships necessary to transport second front material.

Last month production achievements of American shipbuilders made headline news. The industry, expanded many times in 12 months, had fulfilled schedules that brought it into full focus of the bright light of mass production publicity. Independent and government news gatherers, seeking morale building copy, found it along the nation's coast line, Great Lakes and inland waterways.

Shipyard labor spent its traditional holiday at work, setting a record of 223 ships launched or begun. Rear Admiral E. J. Marquart, congratulating men at the Brooklyn Navy Yard, described the achievement since Pearl Harbor as a "staggering total almost beyond the belief of one's own eyes."

Shipyard work was not interrupted for the ceremony. Workers, munching their lunches, listened by radio to the Admiral.

Despite strikes, material shortages and inane criticism of industry by circulation-seeking magazines, over-all production reached an all-time record peak during September.

Both the war-weary President and his production-wise WPB chief Don Nelson told the country that the Battle of

Production had not been won, but that results were certainly encouraging.

In mid-September, Nelson said that the output of war material next year "would be much bigger" than previous estimates of \$60,000,000,000, asserted that the Nation "now is on the big upswing of production." The time has arrived when WPB can make schedules for eventual mass production in a particular plant.

Production, he believes, will begin in full flow in January and February. The job now has reached the point where the maximum is "dictated by the amount you can get out of certain materials", also by such factors as shipping.

Manpower is as serious as material shortages, and here Nelson gave a tip-off, later strengthened by Paul McNutt's freeing of western mining and lumber industry labor: "We have to have workers at places where we need them and at times when we need them. If it can be done voluntarily, well, that's fine. But if it can't be done that way, it must be done some other way."

## Production

Railroad shops, which in normal times reflect the carriage trade rather than mass production, are doing a real war job. Pennsylvania is machining ordnance parts, casting cylinders for Liberty marine engines, machining rolling mill rolls used in making ammunition cases. Baldwin Locomotive is turning out heavy tanks in quantity.

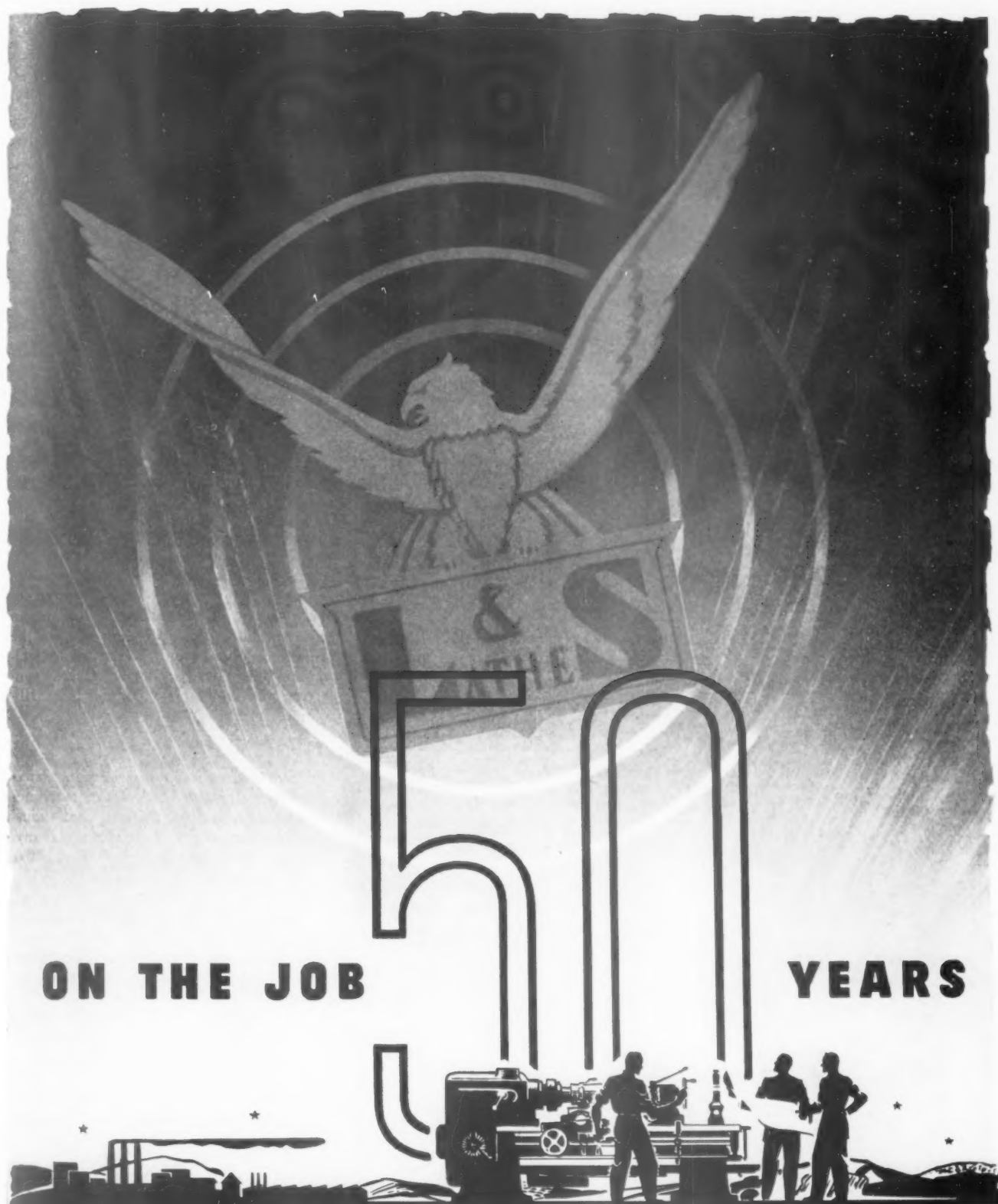
(Continued on page 122)

## "GREENIE"

T.M. REG. U.S. PAT. OFF.

## Vitamins for Victory





**ON THE JOB**

**YEARS**

*Lathes, Good Lathes Only*  
**THE LODGE & SHIPLEY MACHINE TOOL CO.**  
CINCINNATI, OHIO, U. S. A.

ENGINE

TOOL ROOM

AUTOMATIC LATHES

(Continued from page 121)

planes, Henry J. Kaiser, west coast construction whirlwind, is at work with Partner Howard Hughes on the first of these 60-ton jobs. Kaiser says the aerial boxcars will go into mass production before the expiration of the 15, 20 and 25 month-limit the WPB set for the first three.

The WPB has appointed a four-man committee on Concentration of Production to work out plans for concentrating necessary civilian production in a mini-

mum of plants.

Example of the trend: Bicycle manufacture is now concentrated in two plants, one in Massachusetts, one in Ohio.

Further evidence of the trend to complete elimination of all but absolutely necessary civilian production was the order a few days ago establishing strict control over manufacture of radio tubes, signal equipment, other electrical apparatus.

The automotive industry has scored a 36 million dollar gain in production for war, from \$414,000,000 in July to \$450,000,000 in August. Current weapon production is at the rate of \$5,400,000,000 annually, which is 32 per cent ahead of the industry's peak output in peacetime.

The Aeronautical Chamber of Commerce disclosed that its industry made \$2,000,000,000 worth of airplanes, engines and propellers in the first six months of this year. Last year's output: \$1,250,000,000.

About 100 American prisons are now on war production. Output ranges from airplane castings and bomb parts to paint brushes and camouflage cloth. WPB points out that many skilled tool-makers and metal workers are among the 168,000 prison workers on war jobs.

Between June 1940 and June 1942, the WPB estimates, \$80,339,000,000 in prime war contracts were awarded, of which more than half went to plants in eight states with 43 per cent of the nation's population. The states: Michigan, New York, California, Ohio, Pennsylvania, New Jersey, Connecticut, Illinois.

#### Tools

Starting point in mass production is the industry that makes the machines that make the machinery. That industry is machine tools. There, if anywhere, is a bright record of World War Two production achievement.

One of the national news magazines last month stated that if war ended in late 1943, this output of machine tools put to work on post-war civilian goods would leave the industry little to do until 1954.

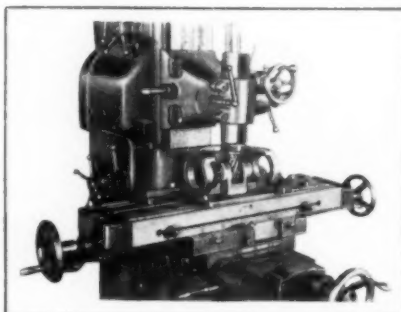
Tool Engineers laughed. Machines on war work are wearing out at an unprecedented rate. Peacetime production saw tools operating 8 hours, 16 at the most, five days a week. War work keeps them on the job 24 hours a day, seven days a week.

The Crowell-Collier Publishing Company, printing more than a million magazines a day, is offering makers of war materials use of its patented process for chrome plating and treating the edges of cutting tools. It claims treated tools have four to 11 times normal life of best untreated tools. Address inquiries for samples to Thomas Beck, President, Crowell-Collier Pub. Co., 250 Park Avenue, New York City.

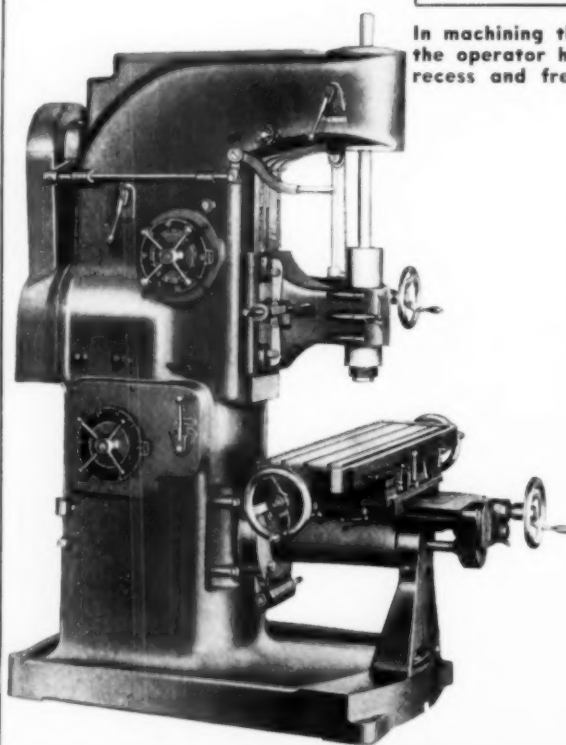
(Continued on page 124)

## Easy to Operate!

**Grouped Before the Operator, Within Easy Reach, One Set of Simple, Convenient Directional Controls. Accessibility Pays!**



In machining this odd shaped casting, the operator has a clear view of the recess and free access for checking.



With this KNIGHT MILLER all tool changes are made at the spindle nose. Spindles are furnished with standard Brown & Sharpe taper and an adapter collet. The operator works from one position with the directional controls within easy reach and the speed and feed controls on the left hand side of the machine. These make for more efficient operation, faster manipulation and quicker set-up.

**W. B. KNIGHT MACHINERY CO.**

3920 WEST PINE  
SAINT LOUIS, MO.





“are you sure  
you’re using the best  
type of portable tool  
for your plant?”

### BASIC ADVANTAGES of the Three Types of Portable Power Tools



**Pneumatic Tools**

Available for a wider variety of applications than any other type.

Generally of more rugged construction. Cannot be damaged by overloading.

Easily stand up under the hardest kinds of heavy duty service.



**Universal Electric Tools**

Run on ordinary AC or DC electric current which is available almost everywhere.

Offer a wide range of models for all kinds of production and maintenance. Installation costs generally lowest.



**High Frequency Electric Tools**

Lowest operating costs for users of ten or more tools.

Maintain virtually constant speed under load.

Nature of high frequency current permits simplified construction for light weight, easy handling, low maintenance.

There are three types of portable power tools — Pneumatic . . . Universal Electric . . . and High Frequency Electric. All three will do your job, but *one* of them will do it best!

Each of the three has construction and service features to fit a particular kind of work. Applied to the job it is best fitted for, one type of portable power tool will out-produce and out-last the others.

Knowing *which* of the three types is best for your work takes expert study. And THOR is especially well qualified to help you decide because;

**THOR makes all three types of portable power tools.**

THOR has the engineering “know how” that comes from building good tools for nearly fifty years.

THOR is working continuously to make the good tools of today even better tools tomorrow . . . to develop new tools for new applications.

THOR has the trained Service Engineers to put this advisory service into practical operation.

Know that you are getting the utmost peak in production and service out of your portable tools by making sure they are the proper *type* for the job. For further information, without obligation, write Independent Pneumatic Tool Company, 600 W. Jackson Blvd., Chicago, Ill.

**Thor**

PORTABLE TOOLS

PNEUMATIC • UNIVERSAL ELECTRIC • HIGH FREQUENCY ELECTRIC

Let Thor help you  
get peak production  
with the right type of  
Portable Power Tools

(Continued from page 122)

"The United States is not only ahead of Germany in the production of cutting tools, but we've topped them in quality and performance as well," stated L. G. Firth, president of the Firth-Sterling Company, last month.

Firth explained that war menaced this country's supply of tungsten and tantalum, vital for tools. Research, he said, resulted in substitution of relatively inexpensive titanium and tantalum, re-

duced the need for tungsten. The new Titanium-carbide tools will cut a gun barrel in one-fifth less time than former implements, he said.

The Uhler Manufacturing Co., Detroit, is moving the equipment of more than 50 small motor capital shops into a Mt. Clemens, Michigan, foundry unused for nine months. The plant will soon commence war work.

The machine tool listing service of

the Automotive Council for war production is finding users all over the country for nearly 9,000 pieces of production equipment moved from assembly lines to snow-covered storage yards early this year.

### Techniques

Use of music to stimulate worker output is becoming widespread. As an example, war work has been set to music at the Westinghouse Lamp Division plant, Bloomfield, New Jersey. Loudspeakers in the main manufacturing area of the plant play marches, tangos and swing five and one-half hours daily, help to relieve nervous fatigue, boost morale. System also relays special messages to workers.

The New Britain Machine Company, on 100 per cent war work, is awarding war bonds and stamps to its 3,000 employees suggesting "workable ideas" for production bottlenecks, efficiency, salvage. The plan is among the first sponsored in the machine tool industry.

Workers on the final assembly of the Curtiss-Commando, largest twin-engine military cargo plane, use a telephone system to communicate from one section of the ship to another. Because of plane size and shop noises, 'phones were installed with electrical impulses generated by three small dry cells in a small metal box carried in the pocket.

### Materials

Backbone of war production is steel. Heartening were the estimates of the American Iron and Steel Institute, placing operations for the past four weeks at 96 to 98 per cent of total capacity, with the weekly output well above 1,650,000 tons. "Experts" who said the industry couldn't keep it up are trying to forget their predictions.

Nonetheless, steelmen have no bed of roses. Reliable reports indicate the scrap situation is desperate, manpower shortages getting really tough.

Now under way is final organization of War Metals Inc., designated by the WPB to collect at least 5,000,000 tons of scrap metal in the balance of this year. Main offices are in Pittsburgh. The government corporation, a subsidiary of the Reconstruction Finance Corp., is expected to buy and scrap old bridges, buildings and other metal that industries and communities can get along without.

By 1943 the aluminum supply situa-  
(Continued on page 126)

## Gray-Mills *Portable* COOLANT SYSTEMS



**T**HE advantages of coolants:—increased production and time-and-tool savings—are being used more and more in the metal working industry. One reason is that Gray-Mills Portable Coolant Systems make it easy and economical to apply coolants to *every machine*—small, large and special. For example; many Sunnen Precision Honing Machines like those above, are rapidly turning out super-smooth precision parts at maximum efficiency—and good coolants properly applied through a Gray-Mills Model G-2A System help them do their best.

Whether your problem is modernization of older machines; equipping small, large and special tools for greatest efficiency, or a stand-by system for emergency, put a Gray-Mills Portable Coolant System to work. You will increase production and save time and tools.

There is a complete range of pump sizes, from 50 to 165 gal. per hour, and pans, valves and fittings for your applications. Prices range from \$39.50 to \$99.50. Phone your distributor—or wire or write direct.

Visit the Gray-Mills booth No. B-418 at the Metals Exposition.

**GRAY-MILLS**

**FLO-BAC COOLANTS** — Four types of quality cutting fluids to cover practically every requirement. Available in 3 gal. to 55 gal. wood or steel containers. Immediate delivery from your distributor or our plant.

**Pump Model G-2** above, has a capacity of 75 gal. per hour—capable of supplying ample flow for small machine tools or up to 4 spindle drill presses.

**COMPLETE PORTABLE COOLANT SYSTEMS  
FLO-BAC COOLANTS, PANS AND FITTINGS**

GRAY-MILLS CO., 235 W. Ontario St., Chicago, Ill.

# Announcing the **NEW GORTON SPIT-FIRE** **ELECTRIC ARC ETCHING MACHINE**



**VERSATILE—DOES LIGHT OR DEEP ETCHING JOBS LIKE THESE** — *Large Photo at Top*—Close-up of Etcher applied to a High Production Job. Parts are ball sockets. Each part completed in 15 seconds—240 per hour. *Other photos above* show adaptability to etching an almost endless variety of sizes and contours, inside Cylinders, Cavities, on V-Blocks, Gages, Gears, Rods, Hardened Pins, etc.

## For Accurate **HIGH PRODUCTION ETCHING** and Permanent Identification of Parts, Tools, etc.

**A NEW GORTON DEVELOPMENT**—"Spit-Fire" Electric Arc Etching—provides the answer to urgent war plant demands for an All-Purpose Production Etcher which *deeply etches hardened parts without burr in minimum time.* Now in use by largest companies.

**MARKS GOODS IN FINISHED STATE** at speed of 120 arcs per second with pantograph machine accuracy. Produces an etch improved in legibility, clean-finish and uniformity. Most efficient on highly polished or ground surfaces, large or small, or on delicate parts such as .0015" Feeler Gage stock.

**PERMANENTLY ETCHES—LIGHT OR DEEP** from .0001" to .003" deep, and from .0075" to .015" wide—on soft to hard metals, including hardest steels—**ANY SHAPE**, on flat or irregular surfaces or any curvatures—*without Forming Guide.* Automatically follows contours with vertical movement up to  $\frac{3}{8}$ ".

**SIMPLE OPERATION—QUICK SET-UPS**—Uses unskilled operator, man or woman. Etching is precision-controlled through pantograph tracing from master. Usually no preparation of work needed. Requires no acid, no pressure, stress or strain. Overcomes problem of metal fatigue—no fissures, no flaws result. Operates on 110 to 120 volts, 60 cycles AC only. Etching voltage, 3 to 9 volts. Current consumption 25 watts, maximum.

**PRESENT DELIVERIES**  
**2 to 4 WEEKS**

**AVAILABLE TWO WAYS**  
Complete Etching Machine  
or  
Portable Etching Unit  
for Other Machines

### **MODEL A-E ETCHING MACHINE**

Equipped with complete "Spit-Fire" Etcher Unit. A simplified Gorton Pantograph machine, developed for best results with the "Spit-Fire" Etcher. Has rugged column and table. Etcher head attached directly to pantograph. Choice of 3:1 or 6:1 fixed ratio pantograph. (Adjustable Pantograph providing 3:1 to 100:1 optional at extra cost.) Model A-E Etching Machine, with "Spit-Fire" Etcher Unit. Price **\$775**



**ETCHER HEAD AND CUTTER SPINDLE INTERCHANGEABLE**—The "Spit-Fire" Head can be installed or removed in a few moments. An ideal set-up for high production work, the tool room, or those odd etching jobs in small shops.

### **PORTABLE ETCHER UNIT**

Available separately for those already owning a pantograph machine and whose work does not justify purchase of the complete etching machine above. The "Spit-Fire" Unit fits any make of conventional pantograph machine. Just remove spindle and slip Etcher shank in its place. Unit consists of Etcher Head, Control Panel with Pilot Light, Transformers, Cables, 36 Electrodes, assorted sizes—in convenient carrying case. Order No. 828-2. Price **\$220**

Write for  
**FREE**  
Bulletin 1635A  
for Full Details



# GEORGE **GORTON** MACHINE CO.

1322 RACINE STREET, RACINE, WISCONSIN, U.S.A.

40 Years

SPECIALISTS IN ENGRAVING DIE MAKING AND SUPER-SPEED VERTICAL MILLING



(Continued from page 124)

tion should be improved, according to WPB's Requirements Committee. Schedules for the U. S. and Canada call for 50 per cent more production than this year's high level. Since 1940, aluminum output has tripled.

Yet for July, August and September, only two-thirds of the defense plants' demands for aluminum tubing could be filled, and only three-quarters of the requests for extruded shapes. Supply and demand were more nearly equal on

sheets and forgings.

The war machine is about to swallow available silver supplies. Some 5,000,000 ounces of silver, all in excess of monetary requirements, is being released by the government for industrial uses. The metal is used as a brazing alloy, as a substitute for tin solder, in airplane engine bearings and to replace copper as an electrical conductor.

Credit to engineers despite political bungling is news that synthetic rubber

production will reach the unexpected and surprising annual rate of more than 900,000 tons by November 1943.

That quantity is considerably more than Far Eastern rubber imports before Pearl Harbor, may relieve civilian shortages sooner than expected.

Rubber plant engineers, talking to Tool Engineer Magazine staff men, have said that synthetic tires for war workers may come sooner than generally expected. Demands within the next few months will be so tremendous, however, policy is not to encourage public.

### Manpower

Labor shortages are becoming as common as tool shortages a few months ago. Silver Thatched Paul V. McNutt, Manpower Commission Chairman, made the first move toward real labor conscription last month, invoked his powers to freeze workers to their jobs in non-ferrous metal and lumber industries in 12 western states. Before these workers can leave their jobs, they must now secure Federal approval.

### SCHOOL BELLS

● Class bells are ringing at 2 a. m. on the Los Angeles campus of the University of California in 25 Tool Engineering courses for aircraft swing shift workers. "The need for additional technical personnel is so urgent that the university has waived all campus regulations to permit these 'dawn patrol' classes," said Prof. Thomas A. Watson, supervisor on training courses in Tool Engineering.

Despite the obvious need for such drastic steps, the President's lady cabinet member, Secretary of Labor Frances Perkins, blandly announced a week later that she doubted labor drafting would be necessary. Using the Ford Willow Run Bomber plant as an example, she pointed out that manpower requirements for war production have been overestimated. Original estimates of 150,000 workers needed at the auto maker's plane plant, she said, have been lowered to 60,000.

What Miss Perkins apparently did not know is that the tool engineering job done at Ford's has proved so remarkably that tens of thousands of men ordinarily needed to meet a production schedule such as that handed the production genius will not be needed.

Such use of tools is not and will not be possible in many industries facing tremendous production schedules.

THE END.

THE TOOL ENGINEER

## THE WILL TO WIN

(as spontaneously expressed by a Cushman employee)

Some time ago when the enemy struck  
"Right into high" went Cushman Chuck  
Machines were pushed . . . with the dedication  
"MAKE MORE CHUCKS to protect the nation"

We'll make the chucks for many a lathe  
To turn the enemy into his grave  
To build a gun . . . and finish a plane  
And drive the Axis back again.

Some of the boys have gone to war  
To fight for the things worth fighting for  
So it's up to us to help this crew  
That worked at a bench with me and you.

The more we produce and the more we give  
Will make more certain our pals will live  
They'll be thinking of us in foreign lands  
With thanks for a chuck and for what it stands.

They know what it means as a tool of war  
They know from the battle just what it's for  
That without a gun there'd be no pluck  
And THERE'D BE NO GUN without a chuck.

So all of us here at Cushman's work  
Will boost production . . . never shirk  
With a steady stream of chucks for the nation  
. . . America . . . Cushman . . . cooperation.

*Eugene Pilkington*

A WORLD STANDARD FOR PRECISION

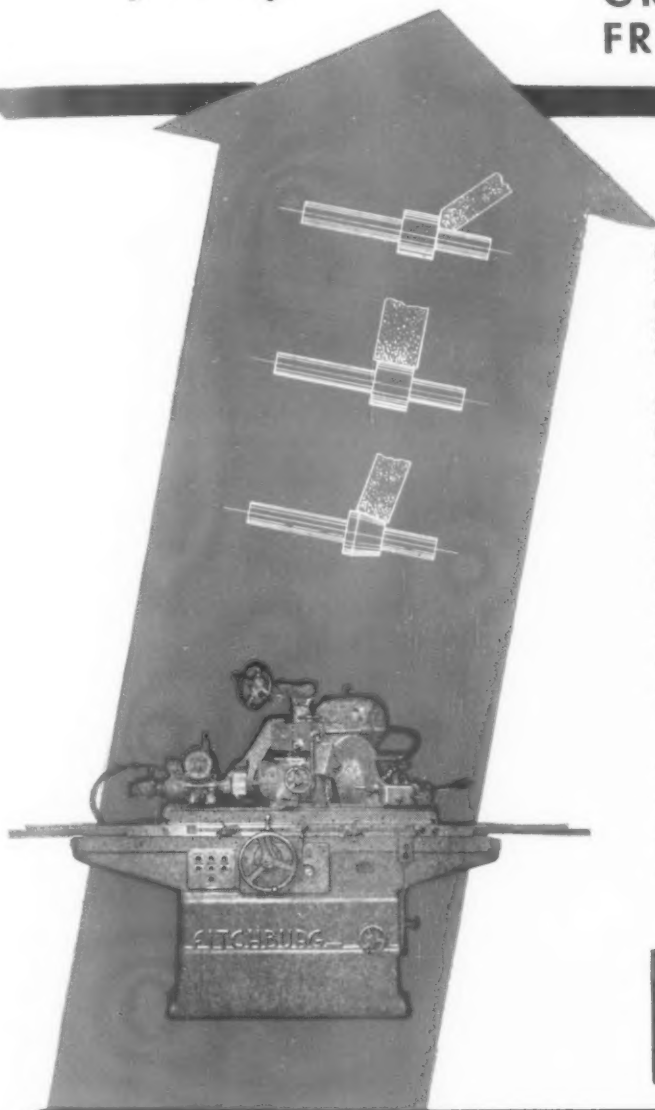
**CUSHMAN**

THE CUSHMAN CHUCK CO. CHUCKING ENGINEERS SINCE 1881 HARTFORD, CONN.

*New* **FITCHBURG ADJUSTABLE "TYPE C"**

# *Angular Head Grinder*

**FOR PLAIN CYLINDRICAL GRINDING . . . . .**  
**FROM 0 degrees to 45 degrees**



The Fitchburg Adjustable "Type C" Angular Head Grinding Machine is another single application of the Fitchburg Standard Bowgag Wheelhead Unit. The "Type C" is designed to handle a wide range, and a number of types of jobs. In finding ways to cut your grinding time and costs it will pay to consider what this machine can do.

This newest of Fitchburg plain cylindrical grinders has a Standard Wheelhead Unit mounted so that it may be located to grind from 0 degrees up to a 45-degree angle. Previously angular head grinding machines have been equipped with fixed heads for single purpose grinding. The Bowgag head on the Fitchburg "Type C" is adjustable and can be swivelled to various positions for standard plain grinding, thus providing greater grinding utility. The head goes through a completely automatic cycle — rapid traverse to work, correct feed, grinding dwell and rapid return. The workhead is adjustable for various lengths of work and the work spindle can be equipped for single or variable work speeds. The truing device is hand operated and mounted on the work table.

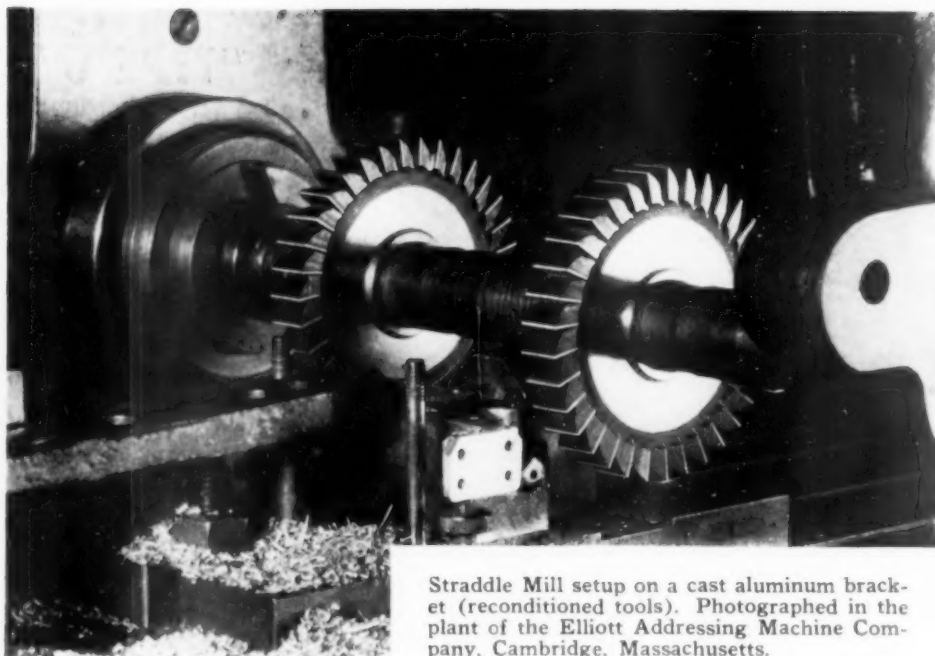
The Fitchburg "Type C" grinder is designed to meet war time production speed and maintain highest efficiency. Ease of operation is assured by centralized controls. In every detail it meets all the requirements of plain cylindrical and taper grinding — in large or small lots of work, with assured accuracy and fine finish, at low cost.

Send for new fully illustrated folder —  
 write for it on your business letter-head  
 — it will be mailed free.



**FITCHBURG GRINDING MACHINE CORP.**  
**FITCHBURG, MASSACHUSETTS, U. S. A.**

Manufacturers of — Bowgag Wheelhead Units, Multiple Precision Grinding Units, Spline Grinders, Cylindrical Grinders, Gear Grinders, Bath Full Universal Grinders and Special Purpose Grinders.



Straddle Mill setup on a cast aluminum bracket (reconditioned tools). Photographed in the plant of the Elliott Addressing Machine Company, Cambridge, Massachusetts.

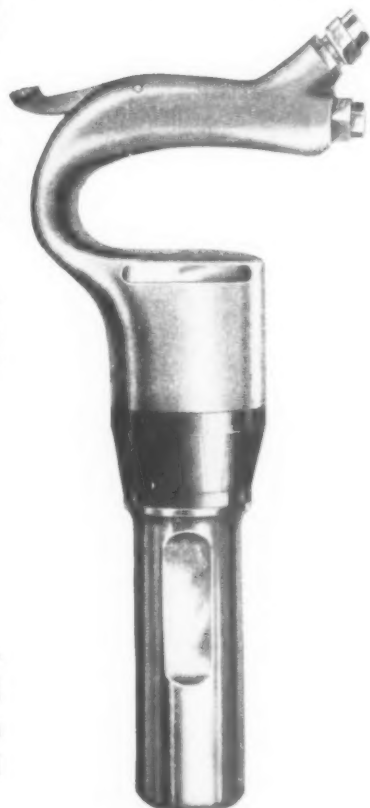
*We are prepared  
to render a*  
**COMPLETE  
TOOL SERVICE**

**TOOL SALVAGE**  
MILLING CUTTERS,  
DRILLS, REAMERS, FILES,  
ETC.

**PNEUMATIC TOOLS**  
REBUILT TO STANDARD  
SIZE WITH HARD CHROME.  
PARTS AND ACCESSORIES

**HARD CHROME**  
PLATING MACHINE PARTS  
AND DIES  
(NEW OR WORN)

Below:  
A Chipping Hammer rebuilt to  
Standard Size with Hard Chrome.



## COLLECT THE PROFIT IN YOUR SCRAP PILE!

The best you can buy in new tools can be bought for 50% less by taking advantage of the worn or outmoded tools that may now be piled up in your scrap heap. When these have been reconditioned by our methods, you'll get the service you expect from new tools.

Our experience in reconditioning all types of tools extends over a period of more than 30 years. We employ top-notch tool engineers. We know that we can recondition your tools so that they will be the equal of new tools—and with real profit for you.

**NO TOOLS OF ANY DESCRIPTION  
SHOULD BE SCRAPPED BEFORE  
YOU CONSULT WITH US . . . .**

Reconditioning worn or obsolete tools by our method is simply a common-sense means of reducing tool costs. If you would like to see how your tool costs can be lowered, and how your production can be increased, let us analyze your particular problem. Or, better still, put us to work on a trial order.

### A COMPLETE RECONDITIONING SERVICE FOR TOOLS



EASTERN CUTTER SALVAGE CORPORATION, 30-32 LITTLETON AVE., NEWARK, N. J.

Western Plant • MASTER TOOL CO., INC., 5605 HERMAN AVE., N. W., CLEVELAND, OHIO

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## CAPITAL COMMUNIQUE

JAY A. BONWIT

Washington Correspondent for  
THE TOOL ENGINEER

Rigid controls over all phases of production near.  
Emphasis will center on the quickest production  
of specific items. Seventy-five per cent of ma-  
chine tools built to be assigned to fill quotas.

**M**AJOR EMPHASIS in war production will be scheduling, with the dual objective of scheduling delivery of raw materials as close to the date of processing as possible, and scheduling of delivery of parts close to the date when required for assembly.

The War Production Board has taken a decisive step in this direction. Operating on the premise that the purchasing officers for the armed services are not able to maintain a complete objectivity in evaluating the urgency of an item needed in their particular branch of the service, WPB Chairman Nelson has made priorities officials of his own staff the final arbiters on rating and re-rating contracts in the field.

★ ★ ★

**W**HERE the military procurement officers previously could validate a rating on a PD-3A application, that power is now shared with a WPB priorities official. These WPB officials have been assigned to work with the Army and Navy contracting officers.

The procedure in handling a PD-

3A application is not changed. However, before the rating is valid under the new procedure, it must carry the WPB official's countersignature.

The field priorities officials operate out of 13 regional offices, and the regional supervisor will review any rating which is questioned. On the other hand, the Army or Navy contracting officer may appeal any decision of the WPB official to an Appeals Board, consisting of Army and Navy Munitions Board members and WPB members. This Board will function in Washington. In addition, a section has been set up to handle the general

problems of processing PD-3A applications.

The effect of the new control system will be to tighten the administration of priorities. The change is basic in policy in that WPB takes over a prerogative formerly enjoyed by Army and Navy officers, but at the same time it is questioned whether there will be any change in actual administration.

★ ★ ★

**A**S FAR AS the overall outlook is concerned, it is apparent that the WPB is revising its operation to reflect a new phase of war production.

It is becoming increasingly clear that the shortages which first became apparent in the critical metals and tools are becoming general. It is further evident that the shortages will be accentuated by a lack of manpower.

The answer, it is believed in official circles, will be rigid controls over all phases of production. Where the previous practice was to encourage all war production to operate at full blast on the theory that such operation would be the quickest way to get into production, the accent now will be on the

(Continued on page 130)

### New Production Chief

Commenting on his appointment of Charles E. Wilson as the new super chief of war production, Donald M. Nelson said, "Mr. Wilson will be the top production authority . . . and will have the responsibility of seeing to it that programs and schedules . . . are met." Wilson heads Production Executive Committee of the Armed Forces and Maritime Commission.

(Continued from page 129)

quickest production of specific items.

It is conceivable that production on some items will not be allowed, as a means of placing more stress on the output of items more urgently needed.

★ ★ ★

**A** GOOD INDEX of future action in the control over production is in the steps taken in control of machine tools. Recent amendment to General Preference Order E-1-b pro-

vides that specific quotas be assigned to the Navy Bureau of Ships, Navy Bureau of Ordnance, Army Ordnance Department, the Air Services (Army Air Forces and the Navy Bureau of Aeronautics), miscellaneous branches and bureaus, the Maritime Commission and the Army Signal Corps.

These specific quotas — not to be made public — will be assigned out of the overall service quota of 75 percent of all machine tool production. Assignment of specific quotas are

significant in that it puts the distribution of machine tools on a service arm basis.

On one hand, the War Production Board is developing its controls along the lines of individual contracts and specific combat items, while the Army and Navy Munitions Board is extending its controls on a service arm basis, as well as a combat item basis.

★ ★ ★

**T**HE EFFECT of these combined measures will be a closer correlation between the production of war materials to the current needs of the armed forces, and the operation of war industry on a minimum inventory of material.

It is conceded in WPB quarters that the system of priorities controls is not perfect, but at the same time, it is maintained that the Production Requirements Plan can do the job. The recent implication of the Rubber Survey Committee report on the rubber situation applies to other phases of war production. The rubber report indicated that while the synthetic rubber program might not be the best possible, this was not the time for experimentation, and the report recommended that the program be "bulled" through as the best way to meet the immediate emergency.

The priorities officials reason along much the same lines. It is conceded that some plan other than PRP might be devised — and in fact has been devised, along the lines of the British warrant system — but at the same time the proponents of PRP feel that the plan will accomplish the requirements of material distribution, and that any major change at this time would tend to disrupt production, rather than facilitate a better type of materials control.

★ ★ ★

**A**CTIONS of importance to the machine tool industry are as follows:

- August 18 — Aluminum Supplementary Orders M-1-o and M-1-f revoked, and Aluminum Supplementary Order M-1-i issued, which combines the functions of the conservation order and administrative actions contained in previous orders, giving the administrative actions formal legal

(Continued on page 132)

### UPP and ADAM Broadcast No. 1001 •• by Mason-Hahn



AS WELDED AND  
ROUGH GROUND →

Wire or write for our catalog today—it shows you typical examples of tools that have been reclaimed by "Suttonizing" such as Reamers, Broaches, Taps, Form Cutters, Drills, Hobs, Lathe Centers, Turning Tools, End Mills, etc.

The "Suttonizing" Welding Process is a new method that can be applied only in our plant. Tools sent to us can be repaired and returned promptly without *post heat treatment* in the majority of cases. Why not take "Upp and Adam's" advice and send us your broken high speed tools, hundreds of others do and are well satisfied.

**WELDING EQUIPMENT  
& SUPPLY CO.**

222 Leib Street • DETROIT, MICHIGAN

# SUNNEN *Precision* HONING

**For INTERNAL DIAMETERS  
of .185" to 2.400"**

**Small • Inexpensive  
Economical • Greater Accuracy  
• Super-Smooth Finish**

**T**ool engineer — sub-contractors — tool and die shops, as well as hundreds of leading prime contractors, are speeding up production and cutting costs with this practical honing machine.

Accuracy within .0001" guaranteed — produces super-smooth finish. Corrects errors of out-of-roundness or taper caused by previous operations. Maintains alignment. Facilitates duplication of sizes. Can be set up and work located in a minute. Does not require skilled labor. Relieves big internal grinders for other jobs.

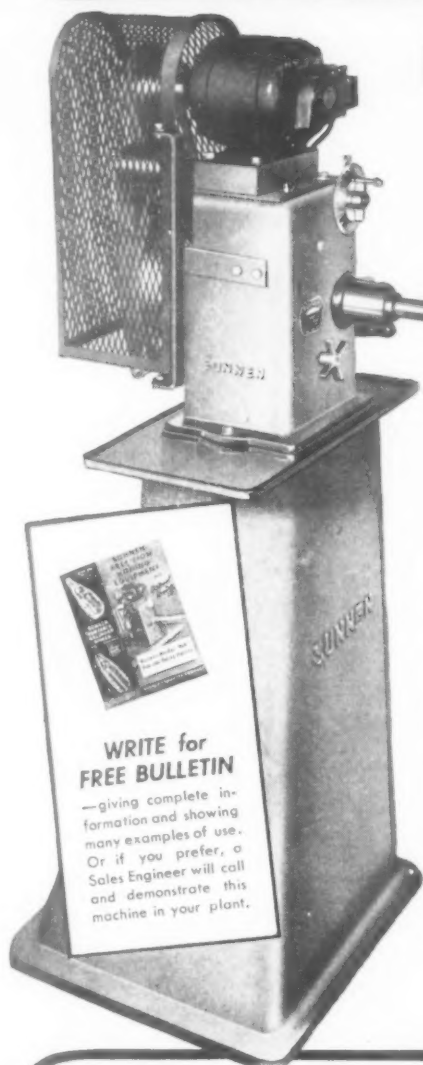
## SUNNEN PRODUCTS COMPANY

7932 Manchester Avenue

St. Louis, Missouri

Canadian Factory: Chatham, Ontario

**SUNNEN**



Hardened Steel Ring Gauge—finished to an accuracy of .000025" for roundness and straightness.



Drawing and Blanking Die "Saves time in producing smooth base metal finish."



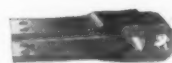
Inner Bearing Ring "Accurately removes last 'tenth' of stock."



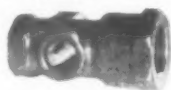
Aluminum Aircraft Link "produces high finish without bell-mouthing."



Better finish and alignment maintained on yoke for compressor.



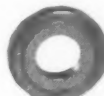
Mild Steel Clevis. Honing was used to correct errors of previous machining and maintain true alignment of the two bearing surfaces of this clevis.



Bronze Valve. The Sunnen method of honing is used to secure a high finish and accuracy.



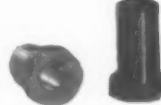
Diesel Engine Fuel Injector Cylinder "So accurate that a piston can be fit within .00005 inch."



Aircraft Valve Tappet Roller. 4-Micro finish.



"Strict alignment maintained between two holes."



Drill Jig Bushing "Increases sales appeal of product."



"Produced an extremely accurate and glass-like finish."



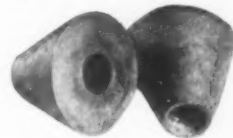
Airplane Engine Parts accurately honed to a super-smooth finish.



Aviation Hydraulic Cylinder made of Aluminum-Alloy. Improves the quality of the bearing surface. An extremely smooth surface-finish is secured.



Hardened Steel Gears. Honing used to remove any distortion after hardening and to selectively size the gears to uniform diameters.



Cones for Wheel Balancing Machine "Accurately align hones two interrupted surfaces."



(Continued from page 130)

standing. The order also tightens use of aluminum by the armed forces, confining its use to ordnance and combat production; also permits use in certain portable tools.

• **August 18** — Amendment No. 1 to General Preference Order M-29 issued, relaxing restrictions on delivery of tungsten ores or concentrates. These may now be delivered by producers,

dealers, or processors to dealers or processors for the purpose of being concentrated, with specific WPB authorization. WPB retains control over delivery of tungsten to consumers. Relaxation ordered because restriction had delayed processing of the ores.

• **August 26** — WPB announced Form PD-595, a so-called "order blank", facilitating the purchase of copper and copper base alloy products, by

holders of the necessary preference ratings. These products were released by action of WPB from owners of frozen, excess or idle inventories. Information on stocks of these products is available from the Copper Recovery Section of the Copper Branch, located at 200 Madison Avenue, New York City.

• **August 28** — An increase of more than 76 per cent over last year in the value of machine tool production was announced by WPB. Production has reached the rate of more than \$1,360,000,000 a year, compared with last year when the value was about \$771,400,000. Value of 28,300 new machine tool units shipped during July was \$113,600,000, compared with 26,600 units valued at \$111,100,000 in June.

• **August 31** — Revision of Military Exemption List to Copper Conservation Order M-9-c confines use of copper largely to ship and plane needs and other essential uses.

• **September 1** — General Preference Order E-2-b announced, superseding E-2-a, which was revoked. New order is designed to speed up delivery of special cutting tools to be used in new or rebuilt machine tools, and provides for changes in production and scheduling of all types of cutting tools, effective October 1. A 10 percent "kitty" is set aside for delivery against orders for special cutting tools required for original tooling.

• **September 9** — In Interpretation No. 1 to M-21-d, formed molding is classed as a fully fabricated article, and removes the restrictions on sales of formed molding made of corrosion and heat resistant chrome steel.

• **September 9** — Order M-227 issued placing copper chemicals — copper sulphate, carbonate, chloride, oxide, nitrate and cyanide — under complete allocation control, effective October 1.

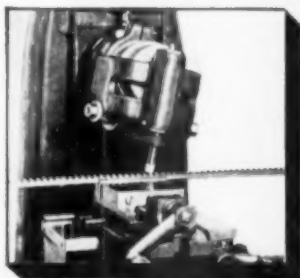
• **September 9** — Phosphorus placed under complete allocation control, effective October 1, under Order M-230.

• **September 10** — Amendment No. 2 to General Preference Order E-1-b issued, fixing quotas for distribution of machine tools to service purchasers.

• **September 11** — OPA has granted price increases by a machine tool manufacturer of Ohio for units subcontracted by the company. OPA pointed out higher prices resulting from subcontracting are due to inexperience of subcontractor in particular job.

THE END

## LIBERTY High Speed Grinding Attachments

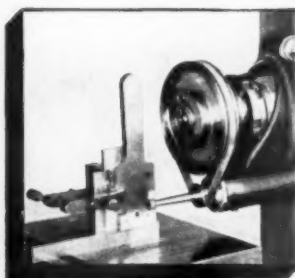


Grinding clearance of broach teeth.

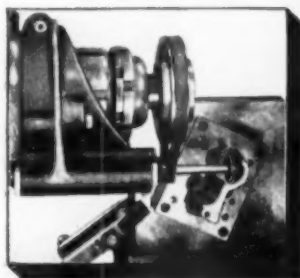
Both horizontal and vertical types are easily attached to most surface grinders for grinding angles, slots, recesses and surfaces which are impossible to reach with large grinding wheels.

For extremely accurate grinding on gages, tools, dies, etc. Assembled complete with any size bores, pulleys, belts and grinding wheels at no extra cost.

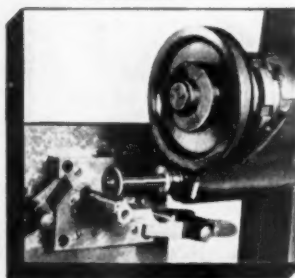
Write for details — specifying diameter of spindle head, type and make of grinder.



Grinding gage in perfect alignment with other points.



Grinding punch form.



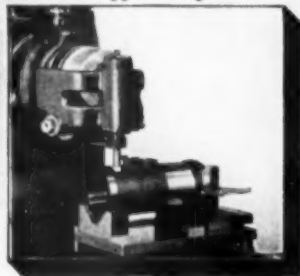
Grinding shoulder on punch.

## LIBERTY TOOL & GAGE WORKS

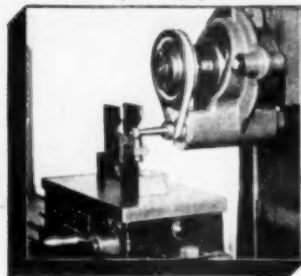
235 Georgia Ave.

Providence, R. I.

Grinding rectangular opening in trigger casing.



Grinding gaging seat on special gage.



*The Tool of Peace  
goes to War....*



The iron or "trade" tomahawk—trade mark of Genesee products—was the first real contribution to better tooling in this country, being used as a general purpose tool by the peaceful Senecas of Je-nis-hi-yeh.

*Last month alone . . . Genesee delivered more "Tomahawk" Quality cutting tools to Industry for the war effort than it produced in the entire year of 1939.*

YET, GENESEE TOOL COMPANY is not a "war baby". It was incorporated in 1934 to supply the needs of automotive companies in Detroit, in Lansing, in Flint, in Pontiac. . . . Growth through the first years was purposely gradual. In those first years Genesee acquired and developed an organization second to none in the designing and production of cutting tools.

In recent years Genesee's growth has been accelerated. Its original plant was expanded,

re-equipped with the most modern of tool production equipment available . . . a second plant was acquired and equipped . . . a corps of trained field representatives was appointed, covering virtually every major industrial center.

Today it ranks as one of the most modern tool companies in the country, producing practically every type of tool used in industry . . . H.S.S. and carbide . . . standard and special . . . for turning and forming, reaming and counterboring and milling, etc.

We will be glad to send you a streamlined condensed catalog of Genesee tools. Ask for catalog No. GT-42TE

**GENESEE TOOL COMPANY**  
**FENTON, MICHIGAN**



★ Registered  
Trade Mark

# OUR JOB

# is *Making Broaches*

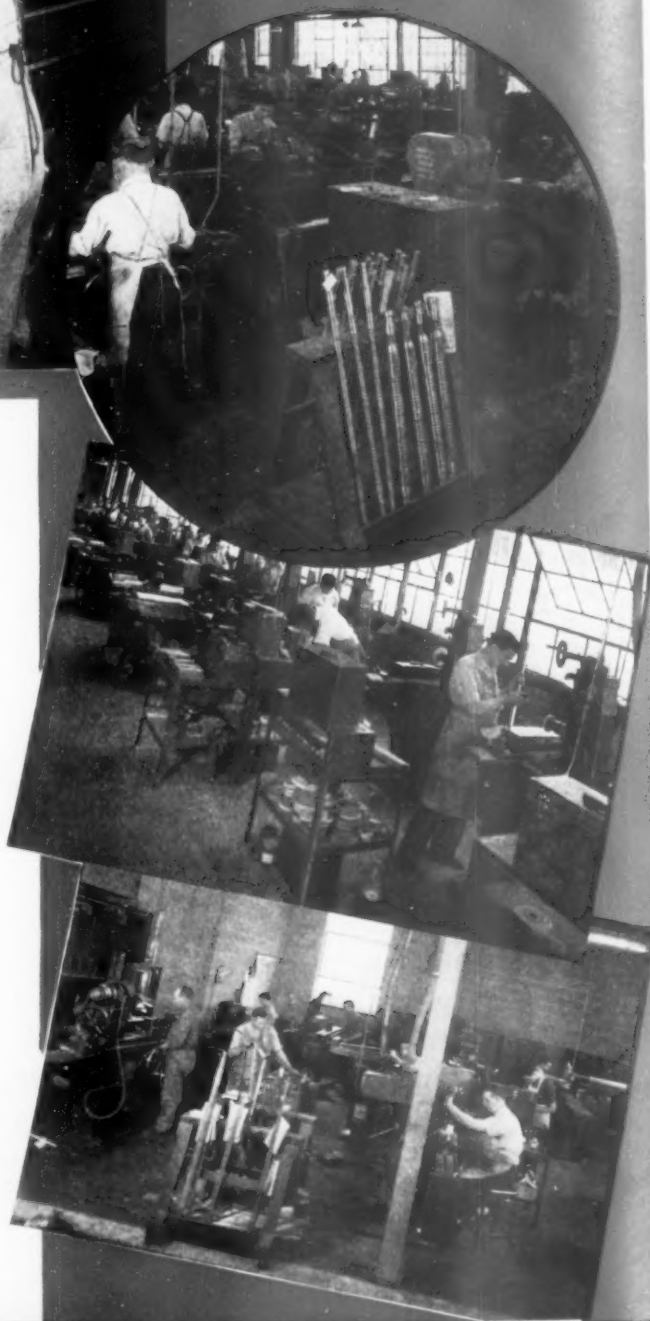


**—and we have the men  
and machines to meet  
your exact requirements**

All we do here at Detroit Broach Company is make broaches and broach fixtures—nothing else.

But that's plenty. It keeps us busy day and night. And in the last few months, we have had to add dozens of new machines to our broach-making equipment.

Today we are one of the largest producers of broaching tools in the country ... proof that we have the "know-how" of broach manufacture ... and that we have the facilities to do a job for you.



**DETROIT BROACH COMPANY**  
20201 SHERWOOD AVENUE • DETROIT, MICHIGAN



## SPECIFICATIONS

- 1 Swing Over Bed, 10 1/2"
- 2 Bed Length, 43 1/8"
- 3 Spindle Hole, 25/32"  
Capacity, 5/8"
- 4 Preloaded Precision  
Ball Bearing Spindle  
Mounting
- 5 12 Spindle Speeds,  
30 to 1450 R.P.M.
- 6 Cross Slide Stroke,  
3 1/4"
- 7 Six Position, Auto-  
matic Indexing Turret
- 8 Stroke of Turret, 3 1/4"

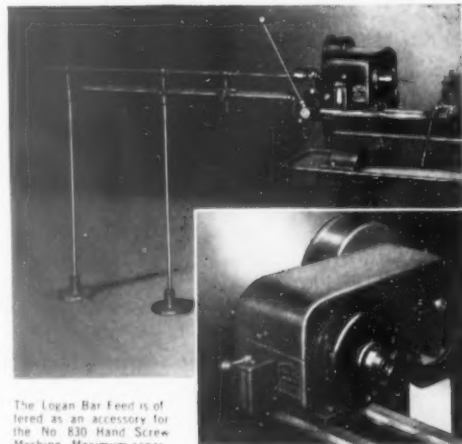
★ ★ ★



NO 830 LOGAN 5/8" CAPACITY HAND SCREW MACHINE

## THE NEW LOGAN TURRET LATHE MEETS SPECIFIC NEED FOR WAR PRODUCTION

The recently announced Logan Turret Lathe was developed to supply the demand for a durable small hand screw machine capable of accurate, continuous production. Small parts made from bar stock of 5/8" diameter and less can be turned out with the same speed and precision as that of larger machines and thus release the latter for heavier work. Built to rigid and exacting specifications and the same high standards as the other lathes in the Logan Line.



The Logan Bar Feed is offered as an accessory for the No. 830 Hand Screw Machine. Maximum capacity, 2" round stock. Maximum stroke, 2". Patented safety cam action locks collet and operates bar feed.

The Logan Speed Collet fits the No. 830 Lathe or others with a 1 1/2" x 8 thread spindle nose feed. Quick acting. Positive squeeze grip. No keys or wrenches needed.

LOGAN ENGINEERING COMPANY • Chicago, Illinois

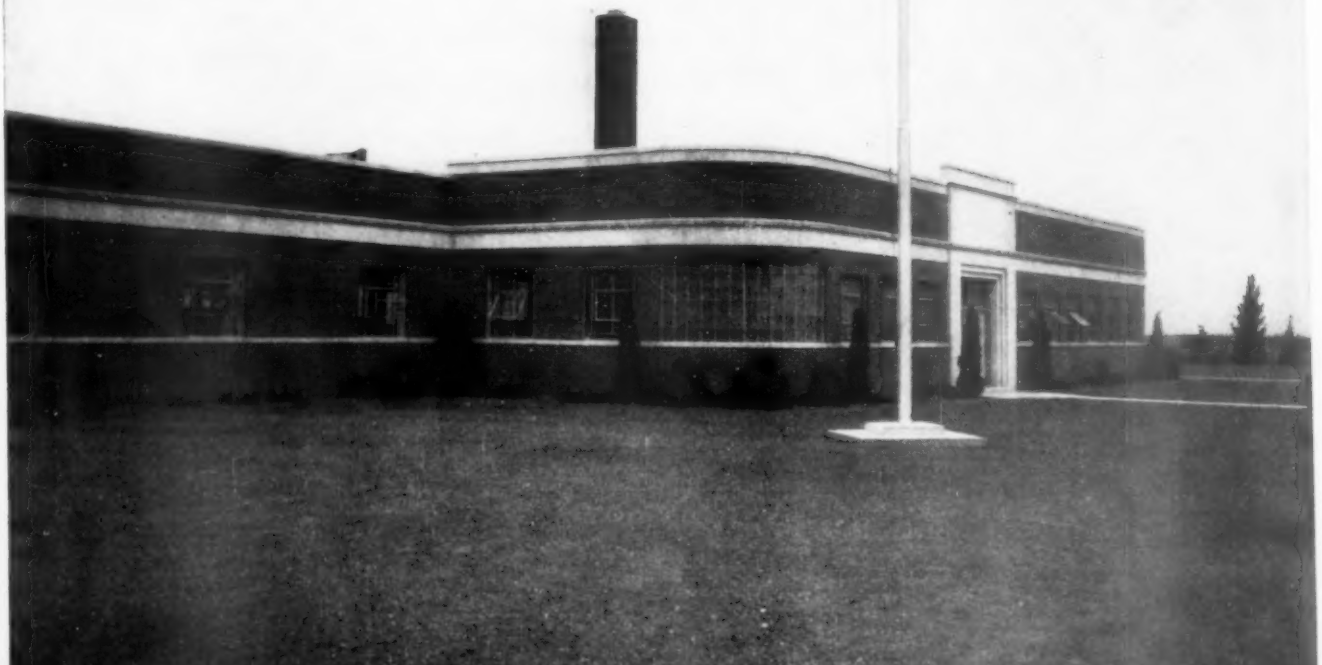
*Logan*  
A NAME TO REMEMBER WHEN YOU THINK OF LATHES

# *A New Modern Plant for* **CARBIDE FABRICATORS**

A plant specifically designed for the manufacture of cemented-carbide tipped tools. Every facility has been provided to produce tools of the highest quality and in ever-increasing quantities.

With new equipment and increased personnel, Carbide Fabricators Company is now in a position to give better service on all orders for standard tools, standard reamers and counterbores and all types of special cemented-carbide tipped cutting tools.

We're all set . . . working day and night and ready to meet your War Production needs.



*Carbide Fabricators Co.*

ROYAL OAK  
MICHIGAN

MFERS. OF STANDARD AND SPECIAL CEMENTED CARBIDE TIPPED TOOLS

# Something *really* **NEW** in Surface Grinders!

New Delta *Toolmaker* Offers An Accurate Big Capacity Surface Grinder With Many Unique Features at a Remarkable Low Price



Never before has there been a surface grinder of this type and quality offered at so low a price. Designed and built to DELTA-Milwaukee standards—it is husky, accurate, versatile, easy to operate, portable—and incorporates many advantages not found in machines costing many times as much. It is ideal for surface grinding, tool sharpening and any grinding operations within its range—and because of its low cost and portability, can be quickly swung into any spot to free machines costing ten times as much.

## Superior Features in Design and Construction That Make This An Outstanding Value

There are so many unusual features on this new Surface Grinder that it has to be seen and operated to be fully appreciated—but here are a few of the "highlights":

**Improved, well-designed spindle**—the "heart" of any Surface Grinder—made extra-long with bearing at either end, widely spaced. Forward bearing is large surface taper bronze bearing of design usually found only in much more expensive grinders—rear bearing is sealed-for-life ball bearing.

**Special Wheel Mounting System**—utilizes two-piece adapter so that either wheel, or wheel and adapter, can be removed. Thus once wheel has been trued up, wheel and adapter can be removed and replaced without need of re-dressing wheel.

**Improved Table**—Smooth operating, with conveniently located control handles—has long ways so that table never "hangs" over end of machine. Gibs provided so that all play due to wear can be eliminated. Micrometer collar, with wide graduations on the traverse adjustment permits accurate settings. The table is provided with T-slot for clamping fixtures or magnetic chuck in place.

**Specially Designed Column**—of one-piece construction, cast of high-tensile iron, normalized and accurately ground to close tolerances. Steel gib guides bracket yoke so it is always in perfect alignment. Entire column, together with bracket, can be rotated 360°.

**SPECIFICATIONS.** Maximum length that can be ground—13½"; Maximum width that can be ground—6"; Maximum space under 7" wheel to table—9½"; Maximum space under 7" wheel to B & S No. 510 Magnetic chuck—6"; Table surface 5¾"x12"; Traverse feed; one graduation is .001"; Maximum adjustment of wheel by means of micrometer is ¾"; each graduation is .0005"; Minimum diameter cup wheel with standard guard in place 3¼"; Maximum diameter wheel 7".

**DELTA  
MILWAUKEE**

## Write for Special Bulletin

giving full details, prices and all specifications on this new DELTA-Milwaukee Toolmaker Surface Grinder. Get in touch with the nearest Delta Industrial Distributor or mail this coupon direct to The Delta Mfg. Co.

### THE DELTA MANUFACTURING CO.

610-L. E. Vienna Ave., Milwaukee, Wis.

Gentlemen: Please send me special bulletin on the new DELTA-Milwaukee Toolmaker Surface Grinder giving full specifications and prices.

Name.....

Address.....

City.....State.....





# Which Costs Less?

This Tool  
is **PRICED**  
Lower!

This Tool  
**PRODUCES**  
More!

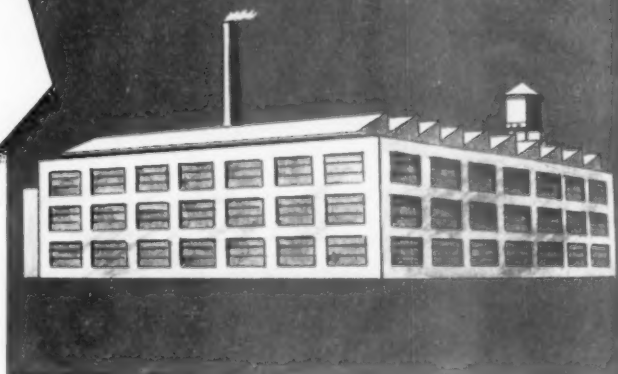
**THIS** is the place  
to find out!

**E**XPERIENCED tool buyers know that it is false economy to buy cutting tools strictly on a price basis. Tool for tool, you get more production and lower actual cost with TECO than with lower-priced tools . . . through higher-speed operation, dependable uniformity and longer tool life.

Tool cost is a small part of operating expense. Original cost at a few cents more, resulting in dollars gained in extra production, proves the economy and value of TECO use.

Put TECO Carbide Tools to the test. Let

**YOUR SHOP**



your own production records furnish your proof. Grades and styles for practically every machining need. Tell us your requirements.

**TUNGSTEN ELECTRIC CORPORATION**  
15 39th STREET • UNION CITY, NEW JERSEY

Branch Office: 2906 Euclid Avenue, Cleveland, Ohio  
Representative: Architects and Builders Bldg., Indianapolis, Ind.

# TECO

Pioneers in Tungsten Carbides  
for over a Quarter Century



# CARBIDE TOOLS



## *Pioneering Pays*

Gatco Rotary Pilot Bushings for Tungsten carbide boring was pioneered by Giern & Anholtt.

Carbide Boring Machines, vertical and horizontal, were engineered and pioneered by this concern.

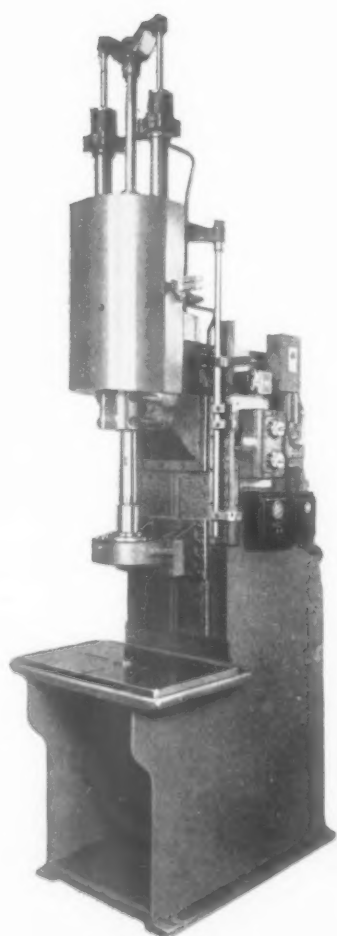
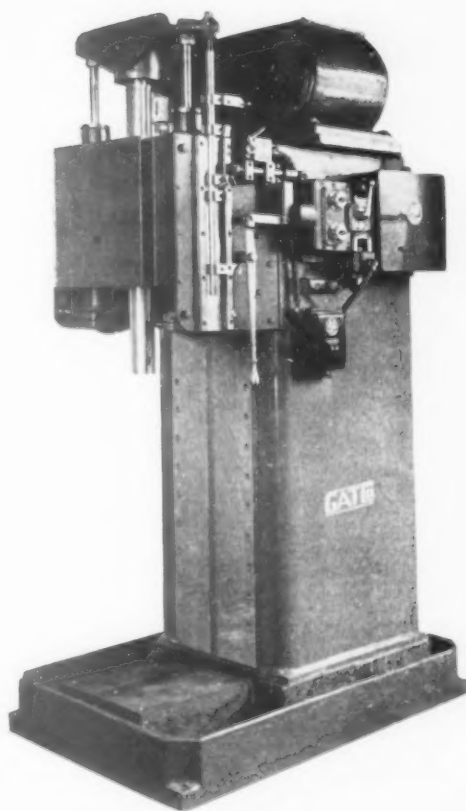
When the call came, this company was ready to deliver the goods.

**NOW** the wheels turn day and night. War-time production leaps ahead faster and faster with Gatco Carbide Boring Machines and Rotary Pilot Bushings. Yes, pioneering does pay!

**GATCO**

**GIERN & ANHOLTT TOOL COMPANY**

1312 Mt. Elliott Ave., Detroit, Mich.



DUST-  
PROOF

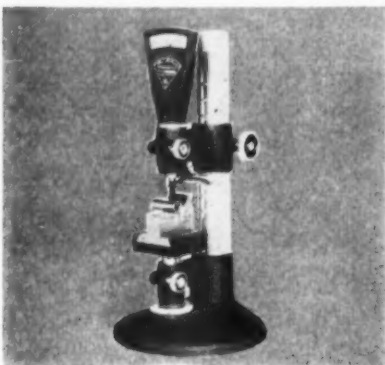


AS A  
WATCH

**OTHER INSTRUMENTS  
IN THE SCHERR  
LIMITED BUDGET  
INSPECTION LABORATORY**



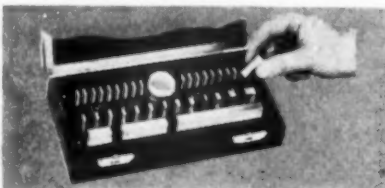
SPENCER BINOCULAR MICROSCOPE, with three dimensional vision, reveals surface finish, imperfections, etc.



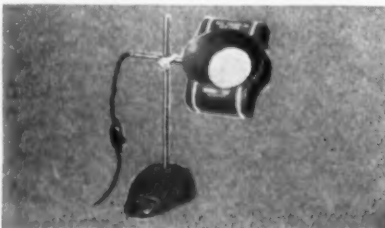
SCHERR COMPARITOL for checking gage blocks, gages and work for size, accuracy and wear.



WILDT PROJECTOR for accurate measuring or comparing objects by means of a magnified shadow image.



ULTRA-CHEX—a 34 block set accurate to .000008"—providing a basic standard of measurements.



MAGNI-RAY—a wide-field illuminated magnifier for close inspection on a wide range of work and operations.

# FOR PRODUCTION INSPECTION



## ACCURATE GAGING

## NOT DEPENDENT ON MEASURING SKILL

The demand for closer tolerances at a time when skilled mechanics and tool-makers are difficult to obtain, makes the use of snap gages a practical necessity for accurate measurement of mass produced parts.

Through the use of ATLANTIC ADJUSTABLE LIMIT SNAP GAGES, accuracy in checking is made possible without dependence on the operator's skill or "feel" on which other measuring instruments depend for precise inspection. Once set, practically any operator can tell by the "GO" and "NO GO" parts of the ATLANTIC SNAP GAGE whether the part under inspection has been produced to the correct, specified limits. Faster inspection as well as more accurate results are assured—production as well as assembly can be stepped up.

ATLANTIC ADJUSTABLE LIMIT SNAP GAGES are manufactured in a modern gage and instrument shop with special machinery and tools and under proper atmospheric conditions for the finest machining, grinding and lapping. Gaging pins and anvils are hardened, ground, carefully lapped and must pass rigid tests for flatness and parallelism. Castings are of MEEHANITE to assure the maximum in rigidity and permanence of form and accuracy.

### MADE IN THE FOLLOWING RANGE OF SIZES

Model A—in 10 Frame sizes and in size ranges from 0-1/2" to 5 1/4-5" inclusive.  
Model B—in 19 sizes ranging from 0-1/4" to 5 5/16" to 5 11/16".

Send for detailed specifications

Write, Wire or Telephone (Canal 6-1464)  
For Quotations and Delivery Dates.

### Scherr Snap Gage Stand



This stand provides a vise or clamp for holding micrometers, snap gages and other tools. It eliminates errors due to body heat and frees both hands for checking work. Greater accuracy and speed in inspecting as well as less fatigue are important advantages resulting from the use of SCHERR TOOL STAND. Price \$7.50. Order Today!

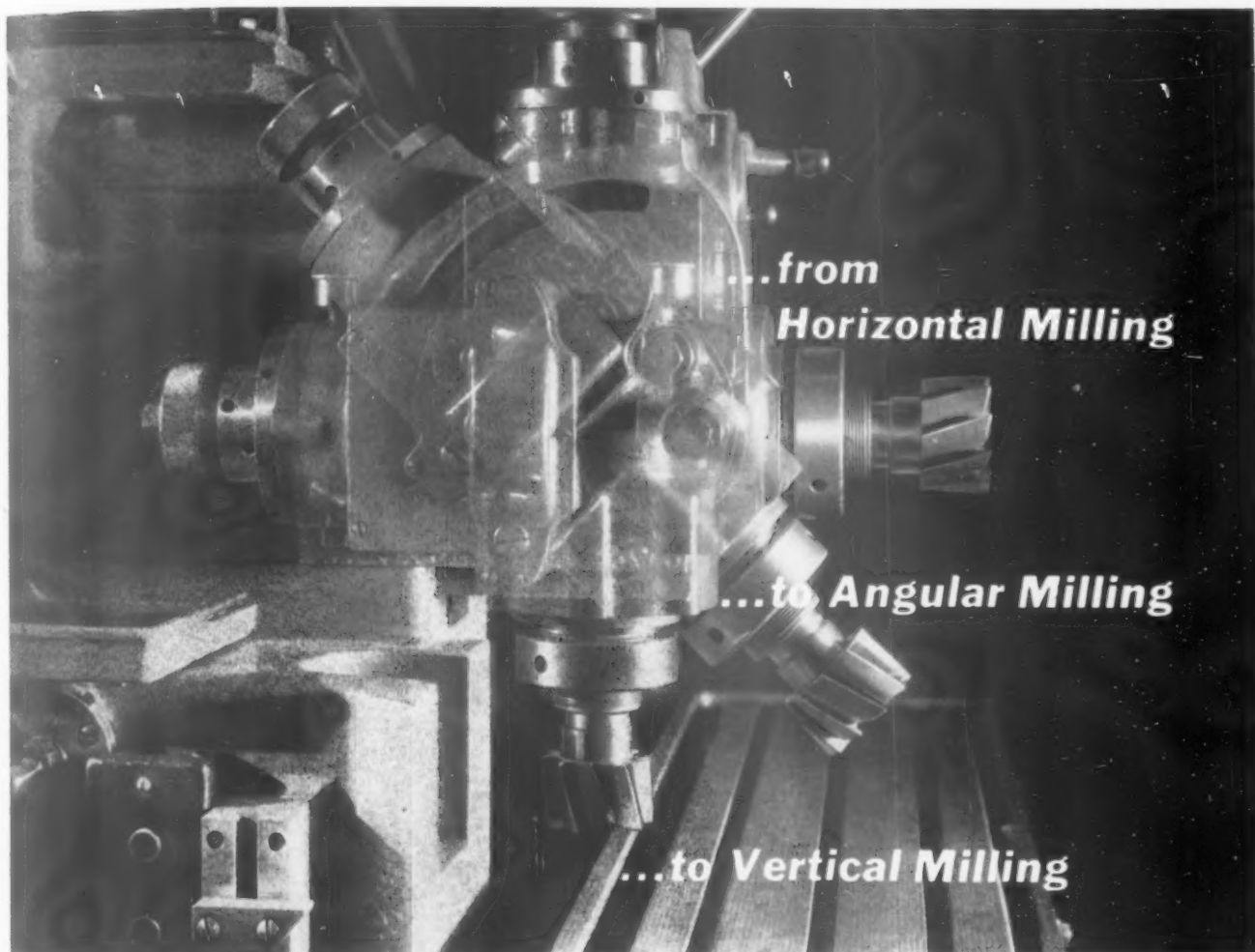
**GEORGE SCHERR COMPANY, INC.**

132 LAFAYETTE ST.,  
NEW YORK, N. Y.



# Quick Changes on Van Norman

## RAM-TYPE MILLING MACHINES



When the operator has completed a horizontal cut on a Van Norman Ram-Type Miller, and wishes to proceed to an angular or vertical cut . . . he does not need to touch the set-up on the table. All he has to do is unclamp the swiveling cutterhead, swing it to the required position, reclamp . . . and start the next cut. Only a matter of moments, compared with the time needed to reset the work. And one of the greatest sources of errors is completely avoided. This exceptional ease and convenience of operation provide gains in time, accuracy and out-

put. So today, throughout America's war industries, Van Norman Ram-Type Millers are delivering the goods in great plenty . . . and in plenty of time.

**VAN NORMAN**  
**Machine Tool Company**  
SPRINGFIELD, MASSACHUSETTS

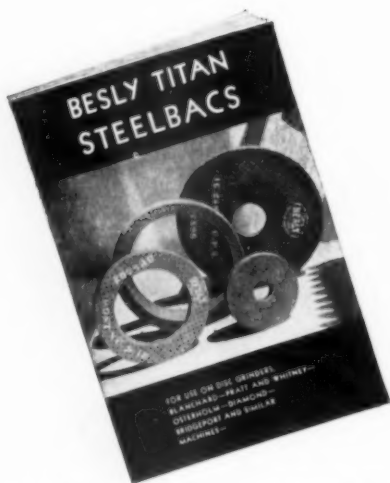


*In June, 1942, Van Norman was awarded the Army and Navy E in recognition of its war production record*

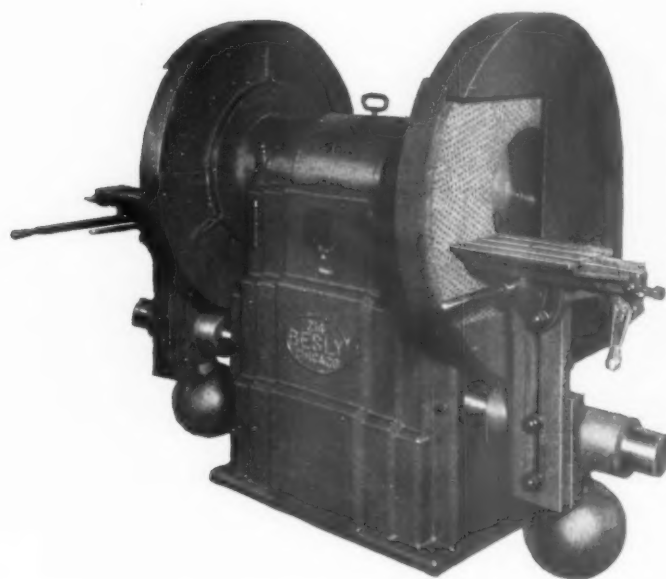
# The RIGHT MACHINE for the Job



Besly can give you the proper machine for your disc grinding operation. From the No. 5-18" light Direct Connected Motor Driven Machine to the powerful No. 214-40" Vee Belt Drive Besly Grinder. Double Spindle Machines for grinding two surfaces simultaneously with grinding members 15" to 72" inclusive—Vertical Spindle Disc Grinders with wheels 18" to 72".



[ Write for your copy of Booklet  
on Besly Titan Steelbacs ]



A great variety of feeding arrangements are available and all machines can be furnished for either wet or dry grinding. If you have a flat surfacing problem put it up to Besly.

## CHARLES H. BESLY AND COMPANY

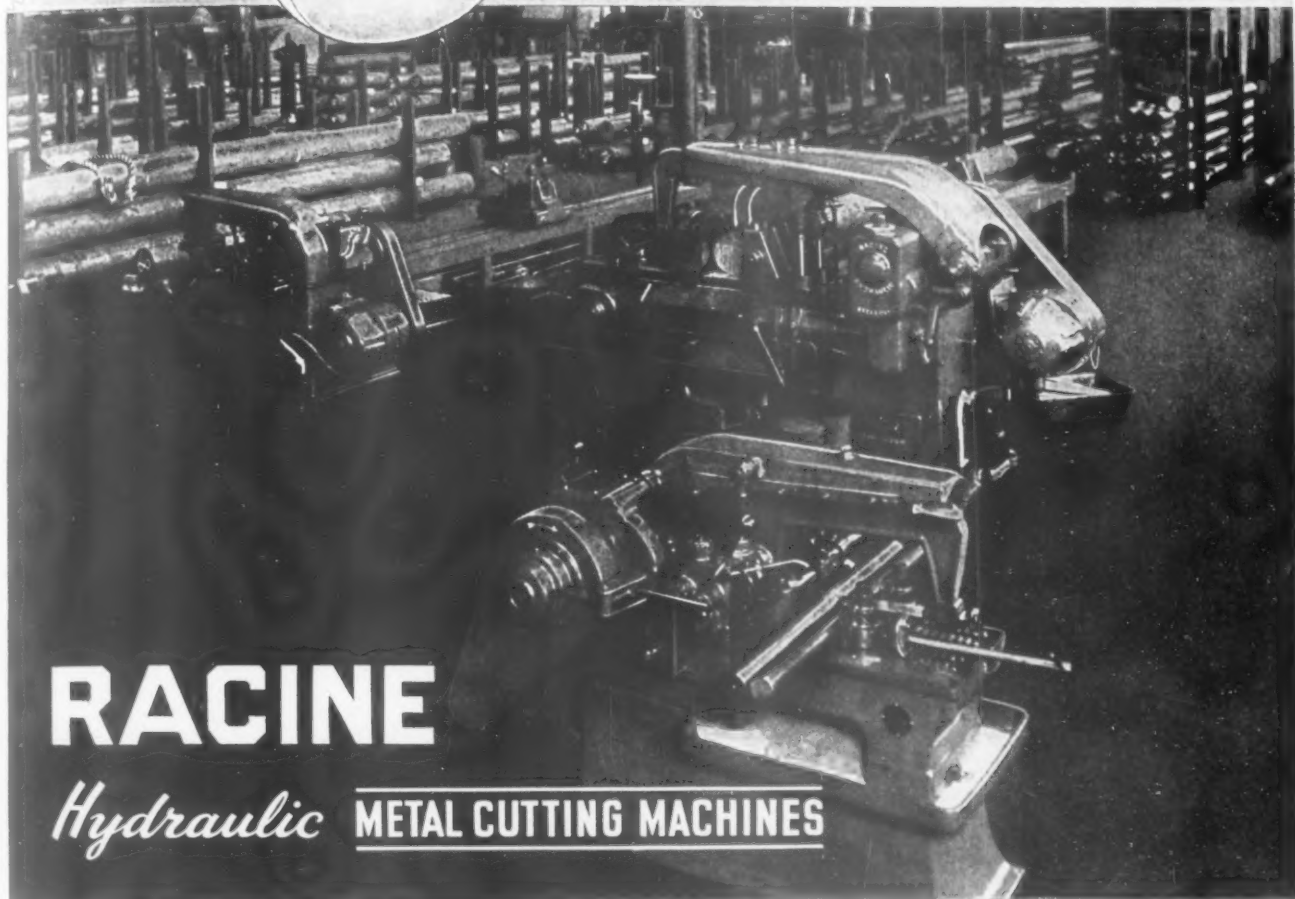
118-124 NORTH CLINTON STREET



CHICAGO, ILLINOIS

# Save

# Materials by PRECISION CUTTING!



## RACINE

*Hydraulic*

**METAL CUTTING MACHINES**

Illustrated above is a battery of RACINE High Speed metal cutting machines. They are fully hydraulic and embody the latest developments in machine tool design. One of the particular advantages the R. K. LeBlond Mch. Co. of Cincinnati, Ohio, found with the use of these modern machines was the saving in materials due to straight accurate cutting and in close accurate measuring and gauging of stock by the hydraulic automatic bar feed machines.

RACINE Heavy Duty Hydraulic Saws are designed to cut accurately at faster production speeds. Each machine has a massive saw guide to tension the saw blade. Wide bearing areas contained in the saw frame provide rigid alignment under heavy cutting feeds and maintain

accuracy in cutting material from 6" x 6" up to 14" x 20"

RACINE controls cutting pressures by progressively feeding and oil cushioning the blade so that the blade teeth cannot gouge or tear thin walled tubing and soft metals. Powerful hydraulic feeds and sensitive accurate control prevents the blade from flinching or riding away in cutting tough die blocks and alloy steels. Such positive accuracy means safer, faster cutting.

RACINE'S complete line comprises saws for every purpose from general Utility types in 6" x 6" capacity to Heavy Duty production models in 6" x 6", 10" x 10", up to 14" x 20". Hydraulic automatic bar feed machines available in 6" x 6" to 12" x 16" capacity. Write today.

**"STANDARD THE WORLD OVER"**

# RACINE TOOL & MACHINE CO.

1777 STATE ST. ... RACINE, WIS.





## *Speed* TO YOUR DEFENSE PRODUCTION OBJECTIVES

Type 'G'  
Self-Opening  
Die Head



Type 'M'  
Collapsible  
Tap



Murchey Taps and Die Heads are enabling defense industries to reach their objectives in record time—to produce accurately threaded parts rapidly and with minimum down time for resharpener and adjustment.

Murchey equipment is producing threads to Class 3 fits in aircraft parts such as landing gear struts, doing threading jobs on tough materials for army trucks, tapping and chamfering the nose of shells and bombs and performing hundreds of other important defense assignments.

Let Murchey experience—concentrated in the field of thread production—help you to speed to your defense production objectives. Write for our suggestions on your particular problems.

**We also manufacture a complete  
line of Thread Milling Machines  
and Shell Tapping Machines.**

# MURCHEY

951 PORTER STREET

## MACHINE & TOOL COMPANY

DETROIT, MICH.

# FAST DELIVERY + + +

# A PLUS FEATURE OF

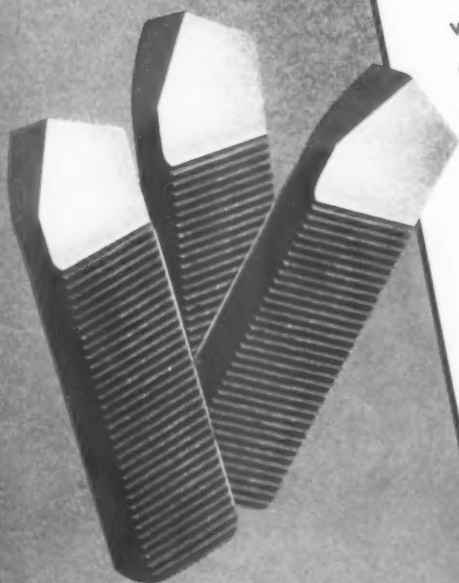
## LOVEJOY CUTTERS

For 26 years, Lovejoy has been noted for prompt, efficient service. Even now, with the rush of war orders, you can expect Lovejoy to rush new Positive-Locking Milling Cutters to you with the least possible delay. We are working 7 days a week to give the service you have always expected. Special tools may take a bit longer, but we will be pleased to give you a promise that will be held.



## LOVEJOY BLADES

The famous Lovejoy Positive-Locking Blades will do double duty for you because they are interchangeable over a wide range of cutter sizes. Lovejoy users appreciate this feature — especially in the pinches! If you do have a few days, however, Lovejoy can supply you out of stock with all standard blades. But be sure to use your present blades to the limit (over 1/2 their length) before ordering new ones, thus conserving scarce material. High Speed Steel, Cemented-Carbide, Stellite, and Rexalloy blades are stocked for immediate shipment.



**LOVEJOY TOOL CO., Inc.**  
Springfield, Vermont, U. S. A.

Please send me the 24-page Lovejoy catalog covering the full line of Lovejoy Milling Cutters and Blades.

NAME..... TITLE.....  
COMPANY.....  
STREET..... STATE..... T.E.....  
CITY.....



Lincoln Park pioneering has again brought about a new method of conserving material . . . of improving and speeding inspection operations.

Surface plates are now being salvaged by hard chrome plating in the Lincoln Park plant. In this process, the old plate is reworked, chrome-plated and then lapped flat. These surface plates, when completed, have a much longer life and the surface is much harder than that of plates made of the usual materials. Precision checking instruments can be moved more easily over the chrome-plated surfaces. Another important feature is that the plated surface resists rust under all normal conditions.

Lincoln Park does not manufacture new surface plates. The work being done is entirely in salvaging, and at the present time, is limited to plates not over 14 inches by 18 inches.



**LINCOLN PARK TOOL and GAGE CO.**

LINCOLN PARK, MICHIGAN

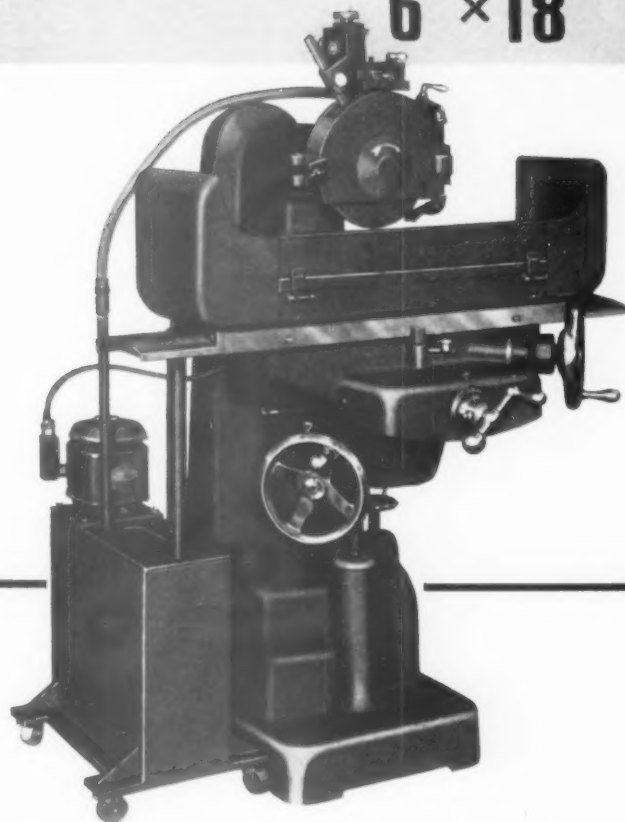


# **No. 15 SURFACE GRINDER**

**PROMPT  
DELIVERY**


**6" × 18"**

Because your War Work can't wait, Covell is in continuous production on this No. 15 Hand Feed Surface Grinder. Ideal for quick set-ups where hand feed control gives desired flexibility. These features, plus low initial cost make this accurate machine a natural addition to your production line or tool room.



**NOW — PROMPT DELIVERIES TO WAR  
PRODUCTION PLANTS.**

*Write, wire or phone for Bulletin TE102, and name of nearest dealer.*



Grinding Machinery Since 1874

**INDUSTRIAL  
GRINDERS**

**COVEL MFG. CO., BENTON HARBOR, MICH.**

## Have You a Special Plate Problem?



**LOMBARD GOVERNOR**—for precision production work—is making accurate and specially heat treated Angle Plates, Scraped V Blocks, Lapping Plates, True Surface Plates, Bench Plates, Parallels and Straight Edges. Making these essential inspection parts requires an engineering knowledge which is available to you for your special plate problems.

Send us your drawings and we'll be glad to quote.



**LOMBARD GOVERNOR CORPORATION**

100 MAIN ST., ASHLAND, MASS., U. S. A.

## A COMPLETE ENGINEERING SERVICE

WITH MORE THAN 150 ENGINEERS FOR

PROCESS & METHODS  
TOOL DESIGN  
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ENGINEERING COUNSEL

OUR REPRESENTATIVE WILL GLADLY CALL AT YOUR REQUEST

**GEORGE SCHER ENGINEERING CO.**

115 FIRST ST.

NEWARK, N. J.

# CLEEREMAN

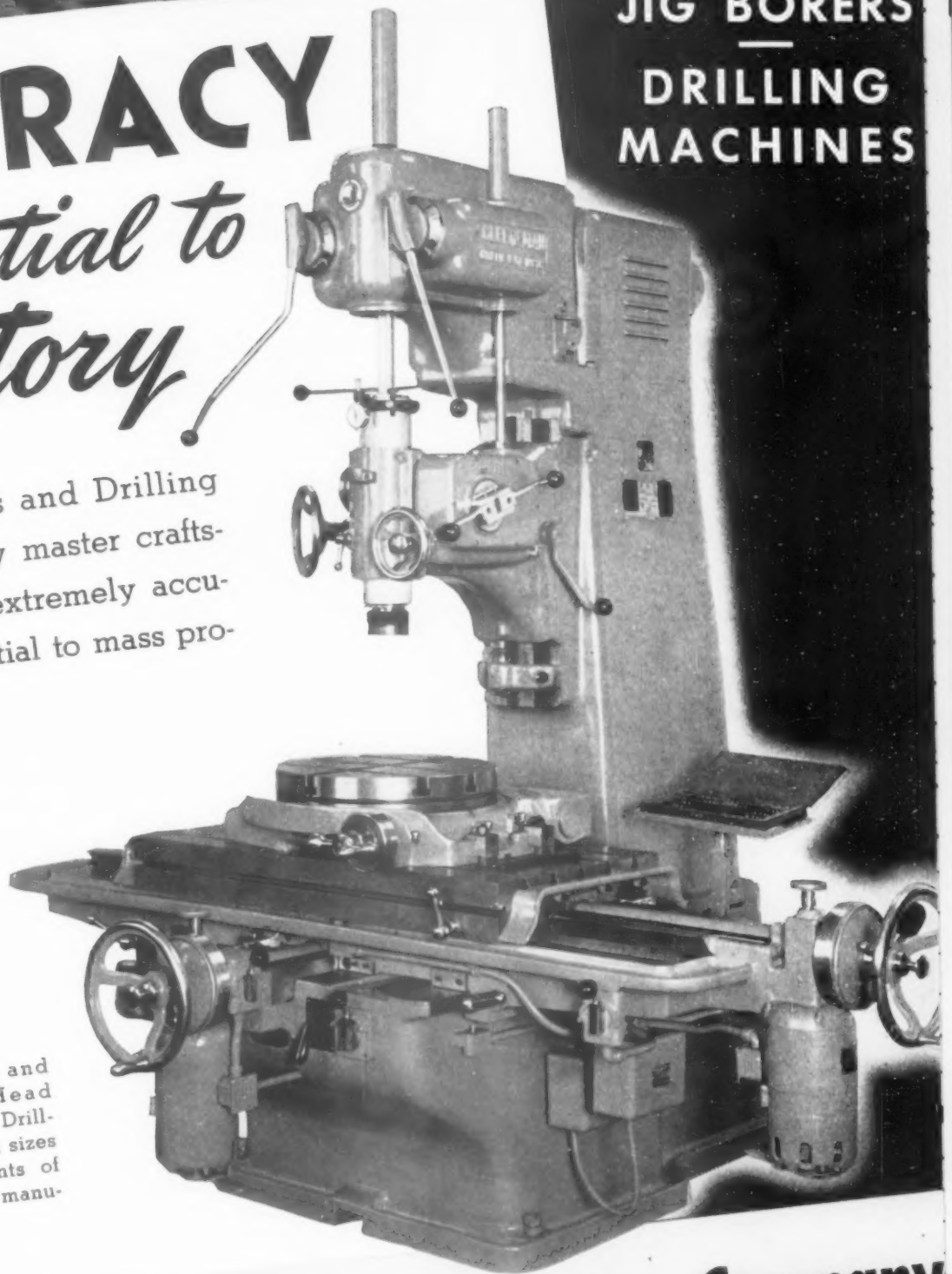
## ACCURACY

*- essential to  
Victory*

Cleereman Jig Borers and Drilling Machines are built by master craftsmen to perform the extremely accurate machining essential to mass production for victory.



Cleereman Jig Borers and Cleereman Sliding Head Round, and Box Column Drilling Machines are built in sizes to meet the requirements of tool rooms and general manufacturing shops.



JIG BORERS  
—  
DRILLING  
MACHINES

**Bryant Machinery & Engineering Company**  
*Sales Division of* **Cleereman Machine Tool Co.**  
400 W. Madison St. • Chicago • Ill. • U. S. A.



# NEW EQUIPMENT, Materials, Processing



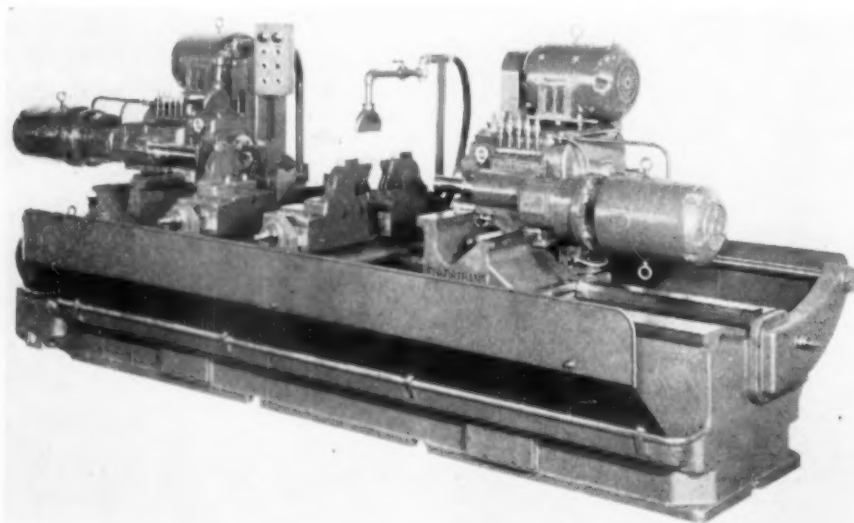
## MILLING AND CENTERING MACHINE

(H77)

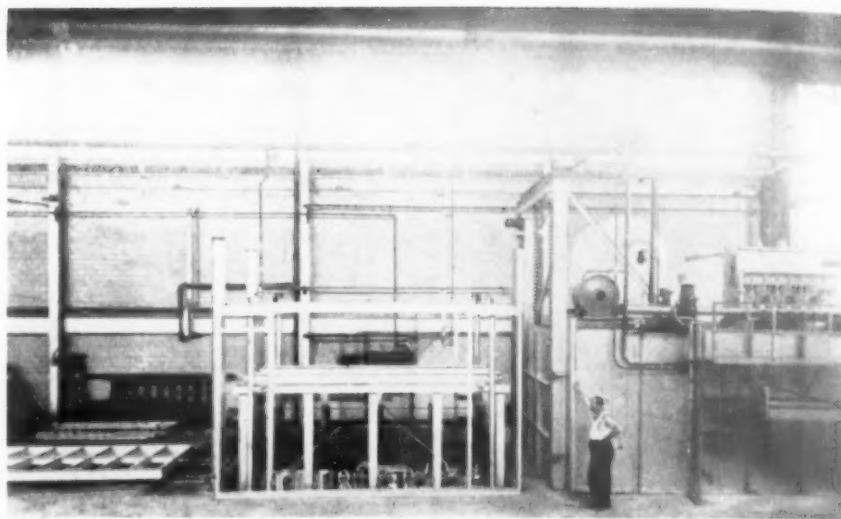
Recently put into production by the Sundstrand Machine Tool Company, Rockford, Illinois, this new double-end milling and centering machine is said to be suitable for milling to length and centering in one handling both ends of shafts ranging from  $1\frac{1}{8}$  to 6 inches in diameter by 14 to 72 inches long.

The machine base has horizontal ways and is an one-piece cast iron unit. Mounted crosswise to the bed ways are two sub-bases which have ways on which the cross feeding heads are attached. Two screw operated, self-centering vises for holding the work are mounted to bed ways between the two heads. Each milling head is independently motor driven and carries a cam operated automatic centering spindle. The main drive shaft to the heads is driven by a fluid motor.

The cycle of operation is completely automatic and it is claimed that one operator can run several machines. The parts are handled but once thus the milling and the centering is in a definite relation and can be accurately controlled. Another feature of the machine is the use of Sundstrand hydraulic equipment which includes a tank unit, fluid motor, and valves to provide the automatic cycle for feeding the heads.



**New Sundstrand Milling and Centering Machine**  
Each milling head is independently motor driven.



**New Heat-Treating Furnace Built By Despatch**  
Claimed to quench 8000 lbs of castings in 25 seconds.

## HEAT TREATING FURNACE

(H78)

Designed and built by the Despatch Oven Company of Minneapolis, a new aluminum heat-treating furnace, said to be capable of quenching 8000 lbs of castings in 25 seconds, was recently installed in a Cincinnati plant. One reason for this fast production is said to be in the material handling system. This system uses a series of rollers which are mounted in the loading section, on

the top and in the interior of the elevator quench-cage, and on the bottom of the furnace work chamber. Whether quench-cage is up or down, it is claimed that these aligned rollers form a level roadway from loading station to furnace.

In operation, a processed load is withdrawn by air winch from the furnace onto the elevator cage and dropped quickly into the quench bath. The waiting load is then pulled directly into the furnace, passing over the quench bath on the series of rollers.

All types of aluminum or magnesium alloys are said to be handled by this furnace, which is of the radiant tube convection type with indirect gas heater. The heat flow from side ducts is both vertical and horizontal.

## 20 TON WELDING POSITIONER

(H79)

Handling a maximum load of 22½ tons with a center of gravity up to 12 inches above the table top, this new heavy-duty unit just announced by the Industrial Division, Ransome Machinery Company, Dunellen, N. J., tilts the load to any position through a range of 45 degrees from horizontal in one direction to a vertical position in the other, and will rotate a similar load with an eccentricity of 12 inches from center of the table top.

Machined and reinforced by ribs on

**THE TOOL ENGINEER**

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## THREE FREE SERVICES... WITHOUT OBLIGATION

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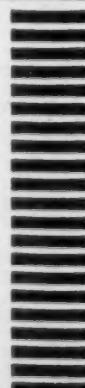
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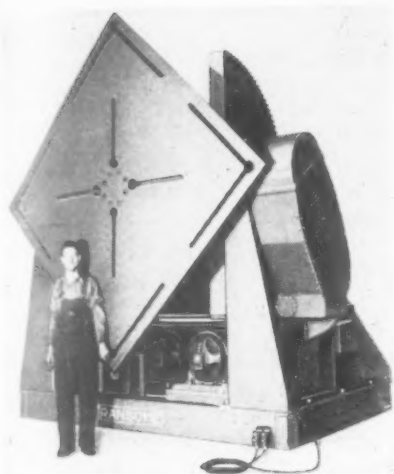


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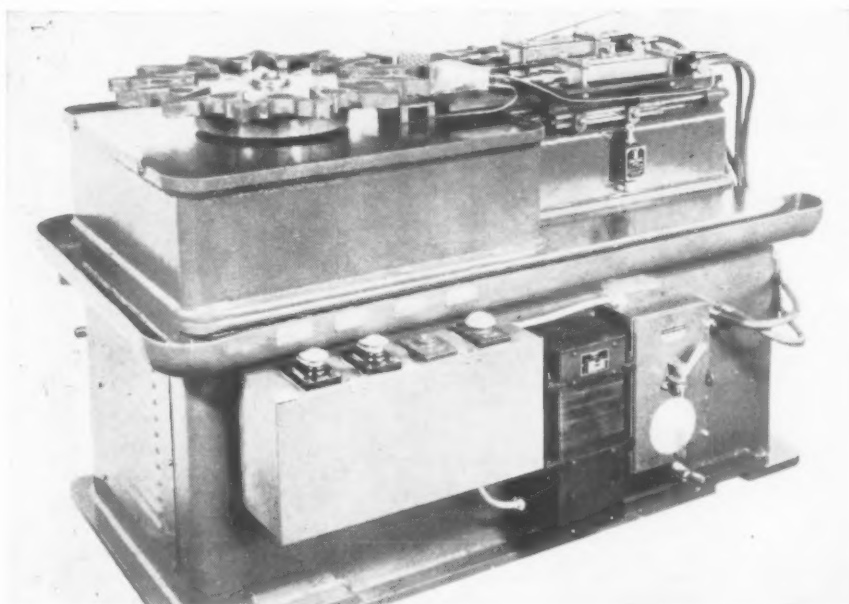
**Ransome Welding Positioner**  
Has maximum load of 22½ tons.

the under side, the 84 inch square steel table top has 4 radial and 4 longitudinal T-slots for attaching the work to the table surface. The heavy base frame is of all welded construction. Controlled through a remote push button control station, the table rotates a full 360 degrees at a speed of 1/3 rpm in either direction.

Separate driving motors are provided thus tilting and rotating may be done simultaneously. Even an unbalanced load is said to be tilted uniformly through the use of two tilting gear segments.

### FLAME HARDENING MACHINE (H80)

A flame hardening machine with base and external housing structures of welded steel design has been announced by



**Hydraulic Machinery's Flame Hardening Machine**  
Water is used as the quenching medium.

Hydraulic Machinery Inc., 10421 Grand River Avenue, Detroit. This machine has electrical control and hydraulic power as a motive source which are claimed to provide positive and flexible operation.

Parts that require adjustment and routine maintenance are on the outside. Pilot light, burners, and water coolant are located on the rear slide and are completely adjustable. To insure uniform results, proper shielding is said to direct the flame and water to the exact surfaces desired.

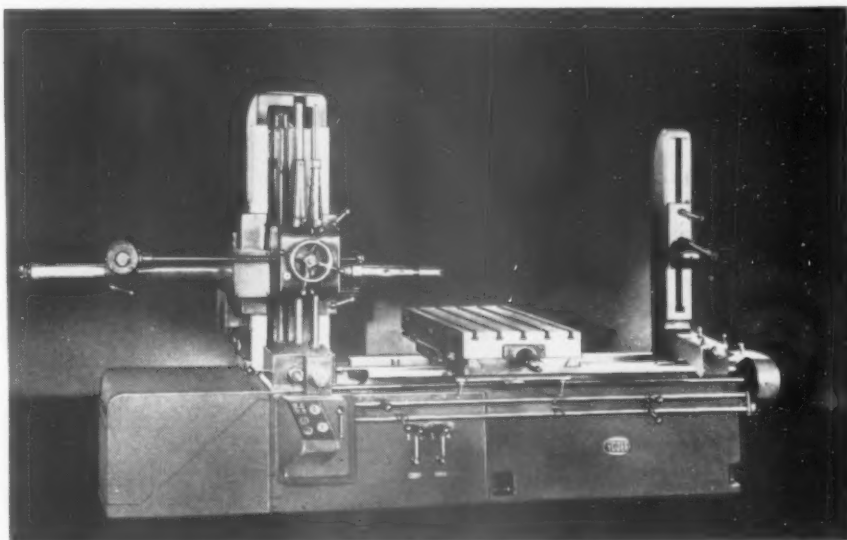
Completely sealed from the actuating mechanism, water is used as the quenching medium. The part to be hardened

is loaded onto the index table, the pilot positioned with a locating pin, the start button pushed, and the machine goes through its complete cycle.

### HORIZONTAL BORING MILL (H81)

A newly designed horizontal boring mill has just been announced by The Yoder Company, Cleveland, Ohio, and features "Power Touch Control" in which the touch and turn of the hand control replaces gear shifting levers.

An infinite number of speeds and feeds, which are said to be obtained without stopping to shift gears, are made possible through the use of this



**Yoder Horizontal Boring Mill**  
Features "Power Touch Control".

centralized control. Another feature of this control is said to be that it causes the positive power flow drive to put every allowable amount of power on the tool. It is also claimed that feeds may be set to a maximum without limitations of step gears.

This machine has 16 to 1 speed variation on the spindle and feed. It has synchronized vernier scales on the head, column, and outer support and all hand adjustment screws are equipped with screw lock micrometer dials.

### INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 151.

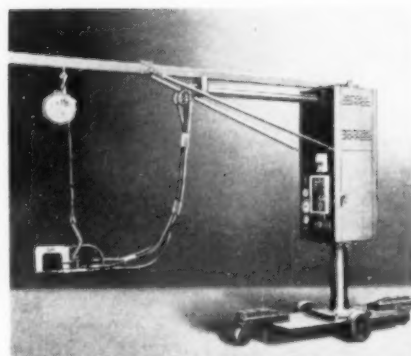
### RADIAL SPOT WELDER (H82)

Equipped with a special welding timer and operating on a single phase

## —NEW EQUIPMENT—

A-C, 220 or 440 volts, a radial-type, gun spot welder in both stationary and buggy-mounted units is now being offered by Sciaky Bros., 1915 West 67th Street, Chicago. An hydro-pneumatic booster supplies the hydraulic pressure which can feed a gun able to supply a maximum electrode pressure of 1800 lbs with 90 psi of air supply.

The maximum area reached by the stationary unit is represented by a circle of 21 feet diameter while the portable unit can easily reach fixed or crowded jigs. This welder is said to be capable of welding corrosion-resisting steel.



**Sciaky Radial Spot Welder**  
Has special welding timer.

## Now more than ever you need this help for Training Tool and Die Makers

Widely used by many companies and trade schools throughout the U. S. it meets urgent need for a complete, up-to-date text for training new men, "refreshing" older men, or trouble shooting in the tool room. The shortage of tool and die makers must be met fast by men who know the "whys" and "hows". This book gives them both and more. It shows how to select tool steel; how to make tools; how to avoid trouble; how to improve tool performance. Read below what others say about this modern text.

### TOOL STEEL SIMPLIFIED

By Frank R. Palmer  
A Vice-President of

The Carpenter Steel Company

315 pages — 205 illustrations

\$1.00 postpaid in U. S. A. Elsewhere \$3.50

**OVER  
22,000  
COPIES  
IN USE**

Low price of \$1.00 per copy makes it economical for training use. Elementary enough to meet the urgent need for a good text for apprentice training. Practical enough to be helpful in advancing the skilled tool maker. Contains hundreds of practical suggestions that can be quickly applied in daily work to get improved tool performance. Send coupon below for a copy of Tool Steel Simplified.

### Read What Others Say:

... Consider it one of the very finest books that our local schools of vocational and adult education might use in training of apprentices in machine trades.

R. L. Welch  
Supervisor Industrial  
Education  
State of Wisconsin

... Simple and easy to read. Contains useful information which commends it to technical men, semi-technical men, and men in the shops who want to improve their ability to make the best use of tools.

Prof. Bradley Stoughton  
Dept. of Metallurgical  
Engineering  
Lehigh University

... Valuable textbook for apprentices and journeymen, and an equally valuable handbook for tool designers and others concerned with the use of tool steel.

J. B. Chalmers  
Director of Training  
The Yale & Towne  
Mfg. Co.

... have read and re-read the book. Became absorbed in finding out and learning so many things I never knew before. Chapter 17 on quenching is worth the price of the book... will need 45 copies for classroom use.

F. E. Laverty  
Worcester Boys' Trade  
School  
Worcester, Mass.

THE CARPENTER STEEL COMPANY  
Reading, Pa., Dept. 4-K

YES, I WANT TO SPEED UP TRAINING WORK. Please send me postpaid your convenient handbook "Tool Steel Simplified". I enclose \$1.00 (\$3.50 outside the U. S. A.) in full payment.

Name.....

Company.....

Firm Name Must Be Given

Address.....

City..... State.....

**SEND  
Now**

## —NEW EQUIPMENT—

pickled steel, zinc-coated steel, and Monel metal in thicknesses from 0.016 inch plus 0.016 inch up to 0.064 inch plus 0.064 inch. It is also claimed that it will weld two unequal thicknesses up to a total welded thickness of 0.500 inch, provided that one of the thicknesses does not exceed 0.040 inch.

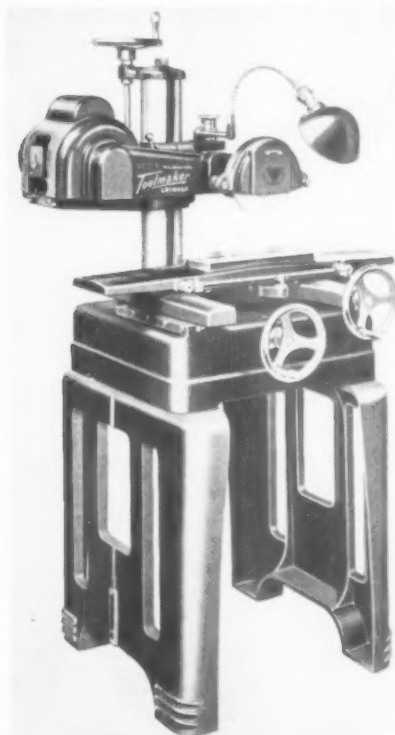
### INFORMATION FREE

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### SURFACE GRINDER

(H83)

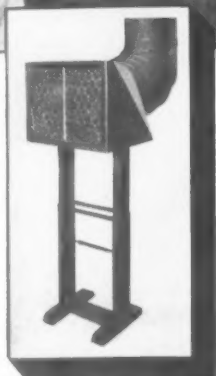
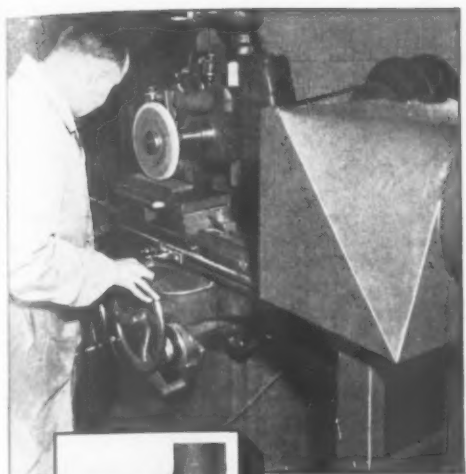
One of the outstanding features of a new surface grinder manufactured by the Delta Manufacturing Company of Milwaukee, Wisconsin, is a unique wheel-mounting arrangement that utilizes a two-piece adapter which permits either wheel, or wheel and adapter, to be removed. This advantage means that once a wheel has been trued up, it can be removed and replaced with the adapter without any further dressing.



**Delta Surface Grinder**  
Has unique wheel-mounting.

The spindle is said to be carefully designed and is extra long with widely spaced bearings at either end to provide permanent alignment. The forward bearing, a large surface taper bronze bearing, runs in a continuous bath of

THE TOOL ENGINEER



The coupon will bring you this new Filtaire folder.

**STOP THE DAMAGE CAUSED BY DUST and DIRT---use the**

*Filtaire*

## PORTABLE DUST COLLECTOR

The FILTAIRE Portable Dust Collector will soon pay for itself when used in conjunction with dry grinding and polishing operations. It is especially valuable in shops where no central dust collecting system is available. These portable units STOP THE DAMAGE caused by dust and dirt by cleaning all air through an inexpensive, replaceable, fireproof filter.

The Filtaire saves on the fuel bill too, because all clean air is recirculated inside—it does not exhaust valuable warm air out of the shop.

Clean air is safe air—get complete information on the FILTAIRE by mailing the handy coupon!

**COUPON**

Please send me complete information on the Filtaire Portable Dust Collector

NAME \_\_\_\_\_ TITLE \_\_\_\_\_

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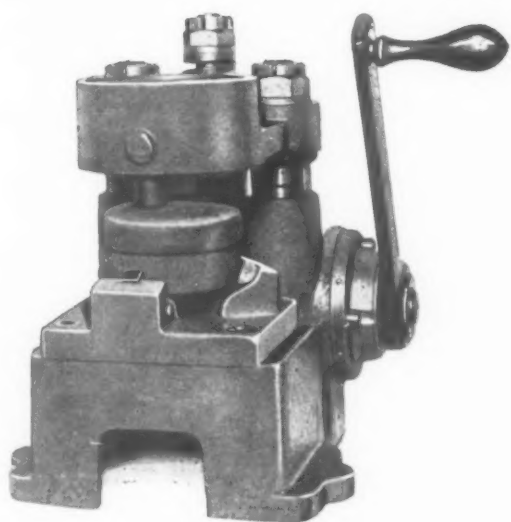
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CITY \_\_\_\_\_ STATE \_\_\_\_\_ T. E.

**EDWARD BLAKE COMPANY**

634 COMMONWEALTH AVE., NEWTON CENTRE, MASS.

J-B TAP GRINDERS — FILTAIRE PORTABLE DUST COLLECTORS — AMERICAN TOOL HOLDERS — BLACK DIAMOND PRECISION DRILL GRINDERS



## SWARTZ STANDARD DRILL JIGS AND FIXTURE LOCKS

AN APPLICATION SHOWING MERITS OF THE LS TYPE FIXTURE. ROUND PARTS CAN BE HELD AGAINST HEAVY DRILL TORQUE BY MAKING DRILL PRESSURE HELP THE CLAMPING. STEEL INSERTS SET ON ANGLE GRIP PARTS; WHILE TOP PLATE AUTOMATICALLY FOLLOWS UP ANY LOWERING OF THE WORK.

ASK FOR CATALOG 941

**SWARTZ TOOL PRODUCTS Co., Inc.**

13330 Foley

Detroit, Michigan

Cleveland—J. W. Mull, Jr.  
Indianapolis—J. W. Mull, Jr.  
Milwaukee—Geo. M. Wolff, Inc.  
Chicago—Ernie Johnson

Represented by  
Canada—Hi-Speed Tools, Ltd., Galt, Ont.  
St. Louis—Mill Supply & Mach. Co.  
Beverly Hills, Cal.—Criterion Tool Sales  
Houston—Engineering Sales Co.

Oneida, N. Y.—W. F. Himmelsbach  
Pittsburgh—J. W. Mull, Jr.  
Toledo—J. W. Mull, Jr.  
Philadelphia, Pa.—Morgan Tool & Equipment Co.



oil. A take-up is provided to eliminate all play. The rear bearing requires no lubrication because it is sealed-for-life.

Other new features include an improved table with convenient control and long ways, a specially designed column of one-piece construction, and a steel gib that guides the bracket yoke and said to insure perfect alignment.

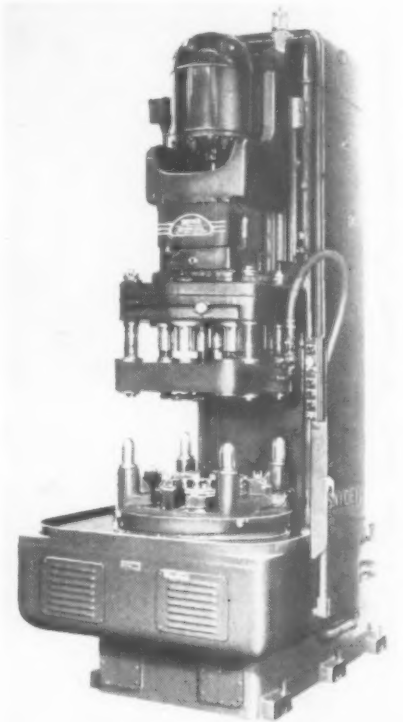
### STANDARD DRILLING MACHINE

(H84)

This standard drilling machine, being built by the Snyder Tool & Engineering Company, Detroit, is said to

have many features of specially built machines. The unit shown in the illustration is the 10 V 18 general utility machine and in this case is equipped for hollow milling 20 bosses, using a 5-spindle head with the fixture indexing four times to complete the work.

This machine has a capacity up to 15 hp, 1800 rpm for driving tools. The maximum stroke is 18 inches and the opening between the base and the speed change transmission is 36 inches minimum and 56 inches maximum. Maximum total hydraulic pressure feeding the hydraulic slide downward is



Snyder Drilling Machine  
Equipped here for hollow milling.

12,000 lbs.

It is claimed that smooth acceleration and deceleration of the Geneva wheel is provided by the standard index mechanism, hydraulically powered from the hydraulic system of the machine.



ALL-PURPOSE  
MOTORS  
TOTALLY-ENCLOSED  
MOTORS  
EXPLOSION-PROOF  
MOTORS  
FLANGED TYPE  
MOTORS  
GEARHEAD  
MOTORS  
SPECIAL TYPES  
BUILT TO  
SPECIFICATIONS  
BUILT-IN  
MOTORS  
LIMA GEARSHIFT  
DRIVES

LIMA "Built-In" Motors may be just what you too want and need. Why not investigate LIMA "Built-In" motors immediately? They are built to your specifications by engineers and workmen who have had years of experience in the field of standard and special electric motor application. LIMA "Built-Ins" are the answer to your problem of securing quality motors, which become an integral part of your own product.

LIMA also manufactures a complete line of standard electric motors, as well as many special types for applications not covered by the standard line. Consult our engineers today regarding your motor requirements.

LIMA Electric Motors supply today's exacting demand for motors with *stability and endurance*. Write or wire us today. Prompt attention to inquiries . . . **PROMPT DELIVERY** on orders.

Large enough to successfully serve you, yet small enough to give personal attention to your needs.



**DRIP-PROOF**  
1 to 75 HP

**THE LIMA ELECTRIC MOTOR CO.**  
OFFICES - NEW YORK - CHICAGO - DETROIT  
LIMA, O. U. S. A.

**EXPLOSION-PROOF**  
1 to 5 HP

POLISHING LATHES

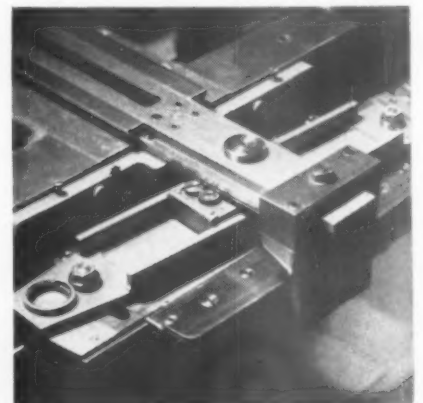
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TOTALLY-ENCLOSED

### INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 151.



"Lucite" Magnifying Lens  
Used on Monarch lathes.

### LENS FOR TAPER ATTACHMENT

(H85)

The Monarch Machine Tool Company of Sidney, Ohio, has installed a magni-

THE TOOL ENGINEER



These units are precision-built—all made of Meehanite iron recognized for its dense, uniform grain structure and its unusual wear-resisting quality.

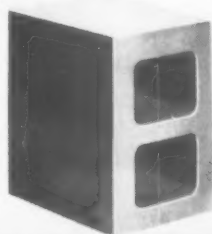
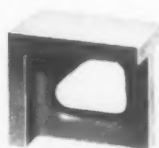
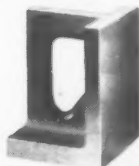
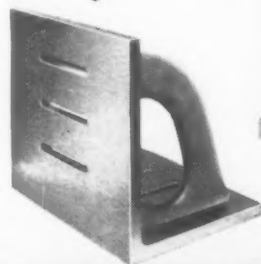
This assures a smooth, flawless surface that increases efficiency of your inspection.

The surface plate has scientifically designed ribs to give absolute rigidity and strength to entire surface.

Send for folder



*Surface Plates  
Angles and Cubes*



**MACHINE PRODUCTS CORPORATION**

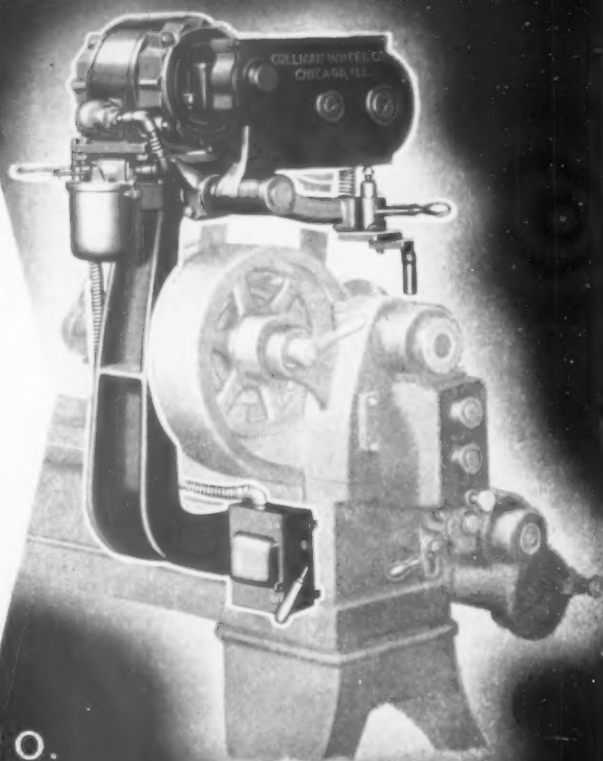
6775 EAST McNICHOLS ROAD • DETROIT, MICHIGAN

TRY A **CULLMAN DRIVE** FOR 60 DAYS  
—without obligation

Get maximum production from lathe, punch press, shaper, or other shaft driven machine with the modern CULLMAN Motor Drive.

Instant, handy control and belt drive smoothness afford 25% time saving on many operations. The CULLMAN Individual Motor Drive can be installed at a surprisingly low cost. It is made to take motors from ¼ to 15 H. P.

MODERNIZE for greater productivity. Try a CULLMAN Motor Drive in your own plant. Ask for the full facts.



**CULLMAN WHEEL CO.**

1352-R ALTGELD STREET, CHICAGO, ILLINOIS

lying lens of "Lucite", produced by the plastics department of the Du Pont Company, Wilmington, Delaware, on the taper attachment of its lathes. Said to insure accurate cutting of tapered metal parts, the lens of "Lucite" methyl methacrylate resin magnifies the graduations and assists the operator in cutting tapers to within one ten thousandth of an inch or less.

This lens, which also keeps out grease and dirt, is claimed to reduce breakage and replacement costs over the material previously used.

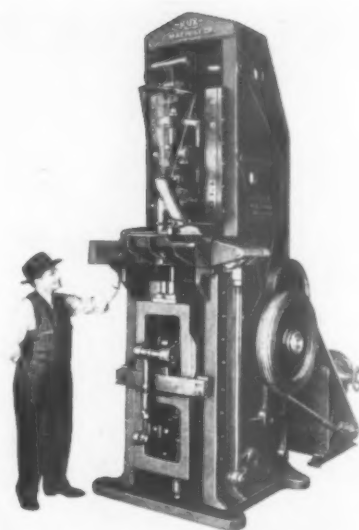
## INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 151.

## AUTOMATIC PRESS

(H86)

Designed to produce parts from powdered metals and ceramic materials, a new automatic press has recently been



Kux Automatic Press  
Parts from powdered metal.

introduced by the Kux Machine Company, 3944 West Harrison Street, Chicago. Among the products formed on this press from powdered iron, bronze, aluminum, and platinum are oilless bearings, iron gears and cams, metal filters, and metallic electrical contact points.

This machine is said to be completely automatic in operation, the filling of the hopper with the powdered material being all that is necessary for continuous operation. It is claimed that this machine permits the manufacture of odd shapes of parts with complicated, cored holes, protruding lugs, and various sectional thicknesses. It applies up to 50 tons total pressure and will produce parts up to 5 inches maximum diameter. The powder cell, or die fill has a 5½ inch maximum.

The total weight of the press is 13,500 lbs. and has a one-piece steel cast main frame which stands 11 feet high. An agitated feeding shoe transmits the material from the supply hopper to the powder cell in the die. The die fill, controlled by an adjustment device, can be increased or decreased at will so that thin parts, or parts with thick sections can be made.

## SIGHT FOR INSPECTION WORK

(H87)

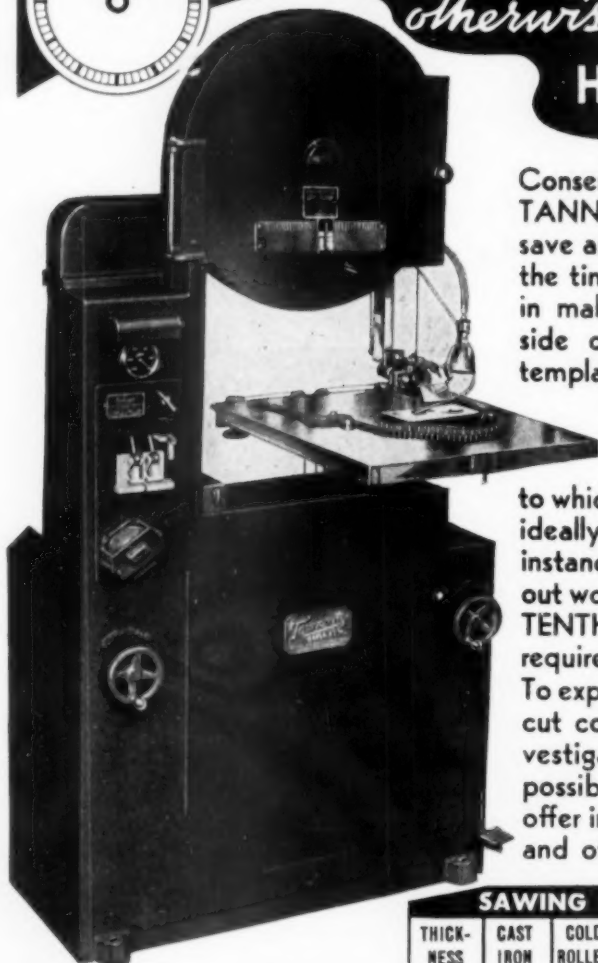
Said to be adapted to close inspection, small parts assembly, and precision machining, four new models of "Super Sight" have been announced by The Boyer-Campbell Company, 6540 Antoine Street, Detroit.

One model has two magnifying lenses, with the lower lens adjustable to the proper focus. The lenses are lighted separately to permit the use of either one or the two lenses as the occasion

## TANNEWITZ DI-SAWS



Do in MINUTES jobs which  
otherwise require  
HOURS!



Conservatively estimated TANNEWITZ DI-SAWS save an average of 70% of the time and cost involved in making inside and outside cuts on dies, shoes, templates and the hundreds

of other operations, including filing and polishing, to which these machines are ideally adaptable. In many instances they are turning out work in as little as ONE-TENTH of the former time required.

To expedite production and cut costs, by all means investigate the tremendous possibilities these machines offer in tool and die making and other applications.

## SAWING SPEEDS PER MINUTE

THICK- NESS	CAST IRON	COLD ROLLED	TOOL STEEL	HI SPEED STEEL	HI CHROME HI CARBON
¼"	16"	9"	5"	23/8"	1½"
½"	8"	4½"	2½"	11/8"	¾"
1"	3½"	2¼"	1¼"	½"	⅜"
1½"	2"	1"	⅝"	5/16"	3/16"
3"	1"	½"	5/16"	5/32"	3/32"
6"	½"	¼"	5/32"	5/64"	1/32"

The popularity of DI-SAWING is growing by leaps and bounds. Get the complete facts on the most highly developed DI-SAW on the market. Simply write for our DI-SAW Bulletin.

Made by Sawing Machinery Specialists

THE TANNEWITZ WORKS, GRAND RAPIDS, MICH.



# *Less sharpening-Greater speed!*

## **Conserves unnecessary oil waste.**

Metal-loaded cutting oils quickly dull cutting edges and build up a production resistance.

Sparkler Filters, with the Horizontal Plates, eliminate the finest metallic flakes that are most detrimental to the efficiency of all cutting and grinding operations.

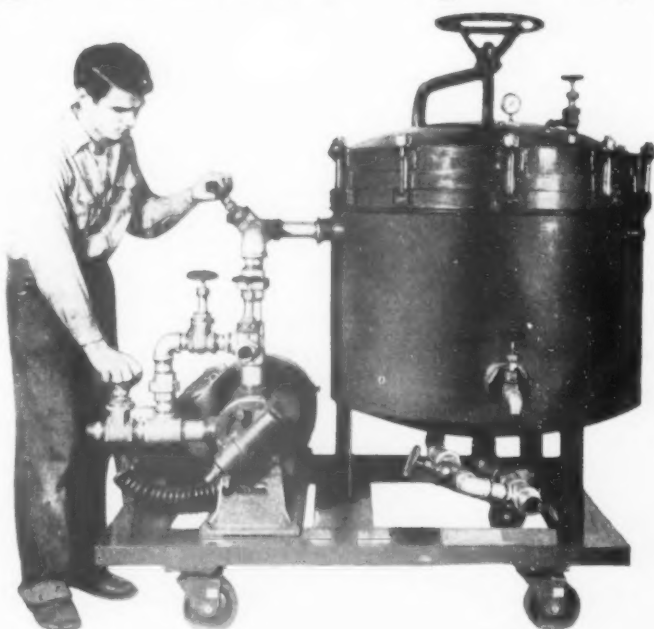
They restore turbid, gritty GRINDING OILS, CUTTING OILS, HONING OILS, TRANSFORMER OILS, PLATING SOLUTIONS, or any other liquid products, into bright, clear re-usable condition.

Sparkler Filters are easy to prepare, clean and operate. Sparkler microscopic particle filtration and purification make disinfectants more effective in controlling dermatitis.

**See our Exhibit at the National Metal Exposition—Booth A-523**

**SPARKLER MANUFACTURING COMPANY**  
277 Lake St. MUNDLEIN, ILLINOIS

**SPARKLER FILTERS**  
**WITH THE HORIZONTAL PLATES**



**Write for full details**

on what you have to filter. Our engineers are at your service.

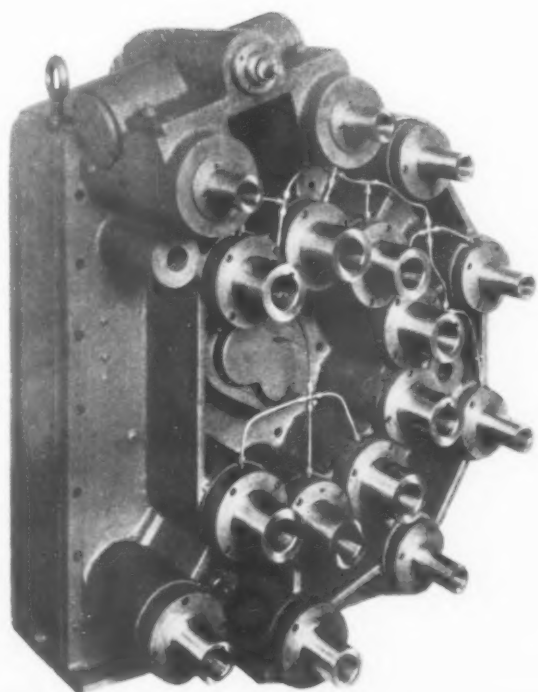


# *Buhr*

## **MULTIPLE PRODUCTION DRILL HEADS**

*Help You*

## **GET THE MOST OUT OF THE MACHINES YOU HAVE**



Sixteen-spindle Buhr Drilling, Counterboring, Facing and Reaming Head, designed for the left-hand head of a 2-way Machine. Vertical adjustment. Two top spindles are accelerated to give three times the feed of the other spindles. Oil pump provides positive lubrication.

**BUHR MACHINE TOOL CO.**

**ANN ARBOR**

**MICHIGAN**

*Specialists in Multiple Spindle Drilling.  
Boring, Reaming, and Tapping Equipment*

demands. For inspection, the head is balanced to the bracket and can be instantly put in most any position over a wide bench area.

The other three models are equipped with one lens. No. 89 U is for precision

### INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 151.



"Super Sight" Inspector  
Adapted to close inspection.



## TRU-LINE TOOLS dress centerless grinding wheels with amazing speed and accuracy!

Shot, shell and projectile forms are rolling off production lines much faster these days because Tru-Line Tools eliminate all the defects and delays incidental to using single diamond wheel dressing tools.

Once positioned to the wheel the Tru-Line Tool needs no resetting, no turning and no changing until the diamonds are completely used.

The desired wheel form is easily obtained with absolute accuracy and, because every dressing is right the first time, there is great

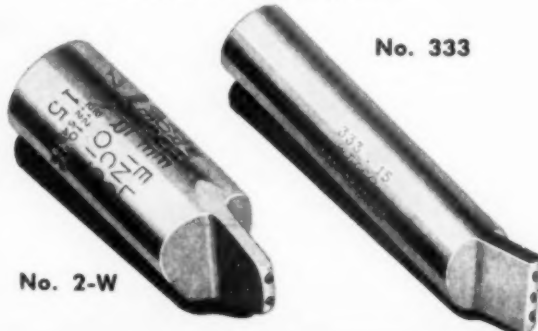
saving in down-time. The wheel is cleaner and freer-cutting and produces many more uniform pieces between grindings.

Savings in wheel cost may be 50% because fewer dressings are needed and fewer passes per dressing.

Tru-Line Tools are available for fast production of all shot, shell, and projectile forms that are centerless ground.

Send for illustrated folder describing the revolutionary, patented Tru-Line Principle, and engineering data sheets.

Covered by U. S. and Foreign Patents



## WHEEL TRUEING TOOL COMPANY

3206 W. Davison DETROIT Established 1910

machining and is fitted with a safety lens to protect magnifying lens when required and is equipped with universal brackets. The "Super Sight" in the illustration, is being used for surface plate inspection.

### NEW WET GRINDER

(H88)

The Hammond Machinery Builders, Inc., 1636 Douglas Avenue, Kalamazoo, Michigan announce a newly designed 20 inch wet tool grinder. Said to incorporate all the latest improvements in its construction, this grinder features a tool rest that is adjustable to any desired angle with replaceable steel wearing plate and a wheel dresser which is said to afford a quick, easy method of dressing the face of the grinding wheel.

The entire unit adjusts in and out from the wheel by means of a detach-



New Hammond Wet Grinder  
Has a new splash guard.

able hand crank, which actuates a protected screw mechanism. The circulating coolant system has a regulating valve in the sludge pan to provide easy regulation of the coolant flow. It is claimed that added protection is given to the operator by the new splash guard across the front of the sludge pan.

This grinder has a 3 hp, totally enclosed, fan-cooled motor which is located in the base of the machine. The grinding wheel furnished is 20 inches in diameter, has a 2½ inch face, and a 9 inch hole for mounting on a large hole wheel flange.

### NEW CUTTING OIL

(H89)

A new cutting oil called "Cut-Aid" and claimed ideal for machining alumi-

*Yes, sir...  
we're making  
prompt deliveries  
on MILFORD  
PROFILE SAW★*



★ The answer to top production on ALL contour-sawing, jig and band saw machines.

To take care of huge war production orders, as well as a greatly enlarged industrial demand, we've increased our production facilities ten-fold. Stocks are good in practically all sizes, and we are making quick deliveries.

That means that you can get the best, and get it promptly. MILFORD PROFILE SAW is made by the world's

largest, most experienced producer of metal cutting band saw.

Carried in stock by Mill Supply Distributors in every locality.

Have you a band saw machine that has not yet been adapted to Profile Sawing? If so, write us for directions and a free sample. Includes specifications of the machine and the cutting job you'd like to do on it.

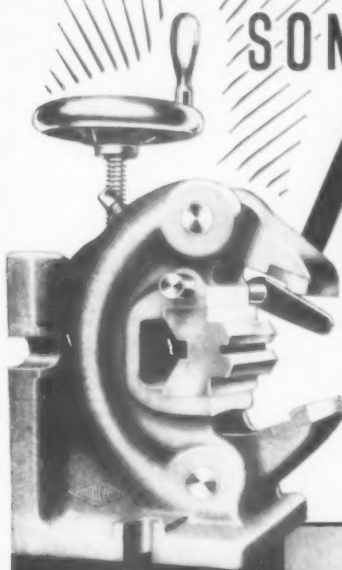
**THE HENRY G. THOMPSON & SON COMPANY**  
NEW HAVEN, CONNECTICUT  
Also makers of MILFORD REZISTOR HACKSAW BLADES

OCTOBER, 1942

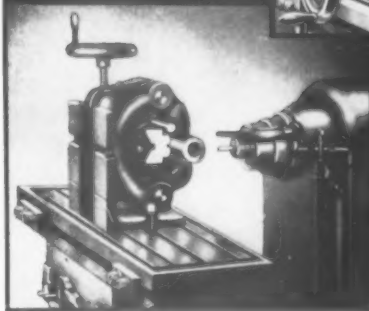
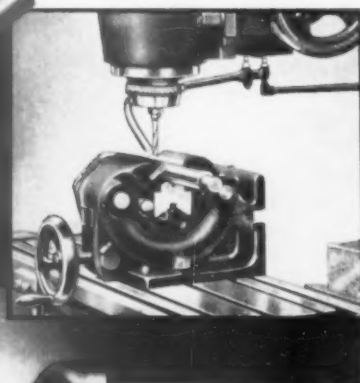
SOMETHING

**NEW**

HAS BEEN  
ADDED!



SELF-CENTERING  
SHAFT VISE



## TO THE LINE OF **PRODUCTO** MODERN MACHINE VISES

An entirely new idea in Vise construction is this Country. For machining keyways and slots in shafts or spindles — range of sizes  $\frac{3}{8}$ " to  $3\frac{1}{8}$ " diameter — suitable for vertical or horizontal mounting. Setting of Vise remains unaltered for all work diameters and insures accurate radial cuts. Shafts correctly located in V jaw by equal movement of two jaws. Hardened V jaw reversible in Vise.

Size of Base 8" x 7  $\frac{1}{4}$ " — Approximate weight 80 lbs.

*Write for circular*



*The*  
**PRODUCTO**  
MACHINE COMPANY

990 HOUSATONIC AVENUE BRIDGEPORT, CONNECTICUT  
3017 MEDBURY AVENUE DETROIT, MICHIGAN



num has been perfected recently by Gulf Oil Corporation, Pittsburgh. The new oil was developed by Gulf scientists following eight years of study and experiment on animal oils such as the oils of whales, hogs, and fish. These oils were chemically broken down and their best properties synthetically reproduced and then blended with mineral oil.

It is claimed that this new cutting oil has greatly increased penetration, cooling power, film strength, and "wetting" ability and used alone or with other cutting oils, is said that tools bite

deeper and cut faster without creating excessive heat.

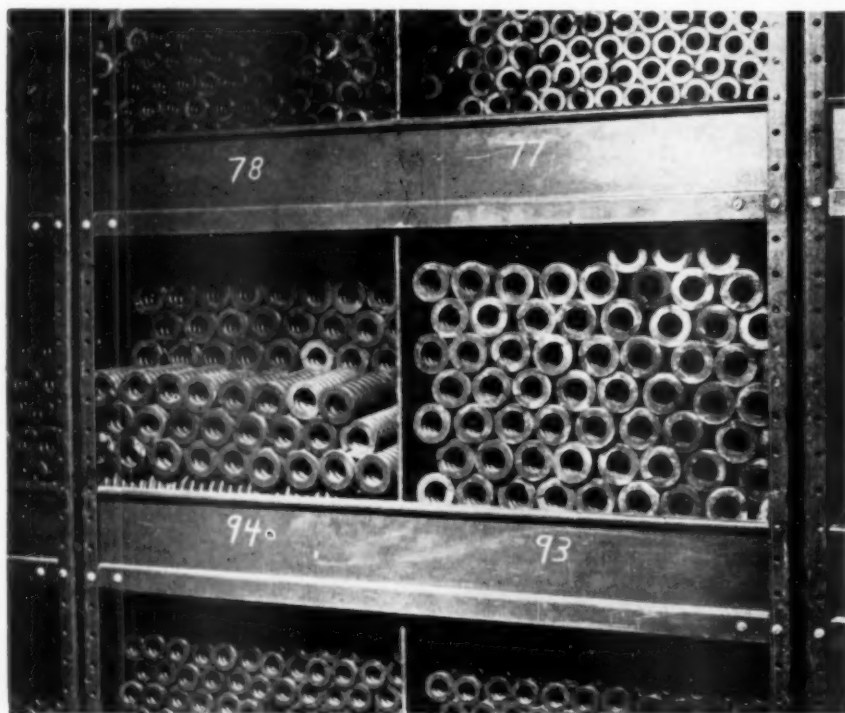
#### TOOL BIT

(H90)

Said to have greater shock-resistance and higher heat resistance, a new metal is being used in a new line of tool bits for machining tough steels and the copper or aluminum alloys. Made by the Black Drill Company of Cleveland, these tool bits are said to be especially suited to work on heavy forgings where deep fast cuts can be made at faster



**Black Drill's New Tool Bit**  
Uses a new type of metal.



## IMMEDIATE DELIVERY ON MUEHLHAUSEN DIE SPRINGS

**FREE! WRITE FOR YOUR COPIES**



New Muehlhausen Die Spring Folder Illustrates, Describes and Prices 206 Sizes and Types of Die Springs for High Speed, Regular Speed and Heavy Duty Presses.

Muehlhausen Spring Corporation  
625 Michigan Ave., Logansport, Ind.

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

Muehlhausen's complete stock of die springs assures you of fast delivery. There are more than 200 sizes available, ranging from 1 to 15 inches in length and exerting pressures from 80 to 3,000 lbs. All are designed to withstand the rigorous demands of modern die work.

**MUEHLHAUSEN**  
**SPRINGS**

EVERY TYPE AND SIZE

cutting speeds. At the same time, however, it is claimed that they give excellent results when used as finishing or forming tools.

Other features include the fact that they are of solid "Hardsteel" and can be reground on an ordinary wheel many times. Made square and round  $\frac{1}{8}$  inch up in all the usual sizes, these tool bits have been reported satisfactory in action on abrasive copper, brass, bronze, and aluminum alloys, either rolled or cast. Wherever lathes, boring mills, shapers, and planers with tool lifters work on hard or tough steels, such as the 4100 series, the high chrome, high nickel, or high speed tool steels, these tool bits are said to give complete satisfaction.

The illustration shows two  $\frac{3}{8}$  inch tool bits, ground as fly cutters to remove metal from both sides of the hole as the work revolves, mounted in boring bar to cut  $2\frac{1}{4}$  inch hole in full hardened 3140 nickel chromium steel links for conveyor chain.

#### INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 151.

#### AIR MOTOR

(H91)

A new line of air motors, trade named Senacon, has recently been announced by the Smith-Johnson Corporation, 623 East 12th Street, Los Angeles. Complete with universal integral valves, these motors are for use wherever reciprocating motion is required. They are said to save time in opening and closing vises and holding fixtures, operating clutches and latches, and moving work pieces and tools to and from each other.

In the above mentioned applications

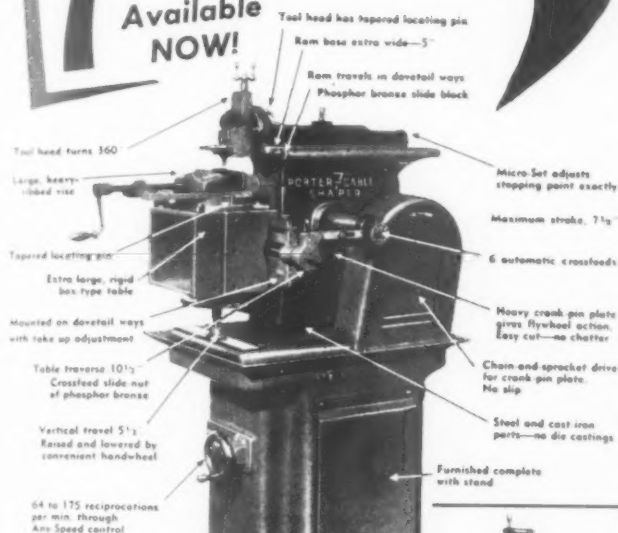
**THE TOOL ENGINEER**

# ALONE IN ITS FIELD!

## PORTER-CABLE 7" SHAPER

WITH ALL THESE UNMATCHED FEATURES

Available NOW!



★ The new Porter-Cable Chain Drive 7" Shaper is the fastest-cutting, strongest, most versatile shaper of its size ever developed. Look at the advantages listed above! In addition this tough little shaper is notable for ease of operation, speed of set-up, fine precision. It has the weight and rigidity, the wear-saving chain-and-sprocket drive, to handle unusual power and heavier cuts. You can't find a smoother-running, more chatter-free shaper anywhere, nor one with such low operating and upkeep cost. Find out more about it from your local Porter-Cable man (name in phone book) or just write us for full details.

**PORTER-CABLE MACHINE CO.**  
1610-10 N. Salina St.  
Syracuse, N. Y.

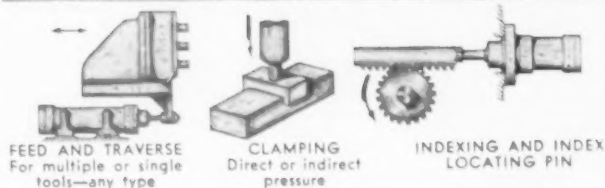
### PORTER-CABLE WET-DRY BELT SURFACER DOES DOZENS OF JOBS FASTER!

● Virtually a specialized tool for every job—this belt surfacer has won wide popularity on assembly lines for doing successive surfacing operations fast! A great "second operation" machine! And because of accuracy down to .0005", it can do many of those fussy toolroom jobs. Works either wet or dry—with belt either vertical or horizontal. Send for FREE booklet showing many applications of Wet-Dry Belt Surfacing! See it demonstrated at National Metal Show, Cleveland.



## DO THESE HYDRAULICALLY

...with less equipment!

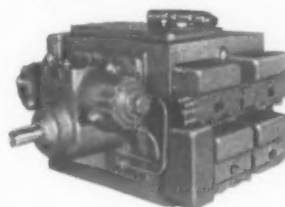


ANY COMBINATION OF THESE THREE FUNCTIONS EASILY OBTAINED WITH BARNES HYDRAULIC UNITS . . .

You can obtain complete Barnes hydraulic units or panels for milling, boring, grinding, drilling and other metal working machines. Built from standard hydraulic elements they can be made to include various combinations of feed, traverse, indexing and clamping to suit functions of your specific machine. You eliminate excessive gearing and machining of long splines and gears of mechanical feed units. You obtain infinite feed range, instead of positive steps, resulting in maximum efficiency in metal cutting.

### FOR NEW OR EXISTING MACHINES

Many production shops are changing existing mechanically-operated machines to hydraulic actuation by simply applying Barnes units. No hydraulic engineering knowledge is necessary to obtain these advantages on new or existing machines. You merely establish the movements and functions to be done hydraulically; our engineers will design the proper unit while you design or rebuild the machine.



### TWO METHODS AVAILABLE

**Method 1.** Use a Barnes Self-contained Hydraulic Unit. It can be designed with necessary pumps and valves to complete hydraulic functions of your machine. Oil reservoir is included—providing cylinder space and connecting two pipes to each cylinder constitutes your total hydraulic effort.

**Method 2.** Use a Barnes Panel Unit—similar to above, except provision must be made in machine for oil reservoir and motor mounting.

### GET THIS Free BOOKLET

40 page book with typical installation circuits, piston and gear pump data, complete information covering basic elements of construction, and installation of standard units used in these highly successful hydraulic circuits.

Write for your copy today. Ask for Bulletin T.E. 1042.



## John S. Barnes Corporation

DETROIT SALES OFFICE  
503 NEW CENTER BLDG.  
TR-1-1704

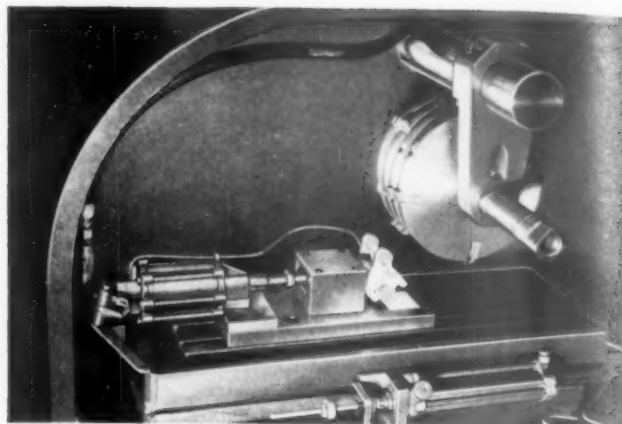
MAIN OFFICE  
AND FACTORY  
ROCKFORD, ILL.

## —NEW EQUIPMENT—

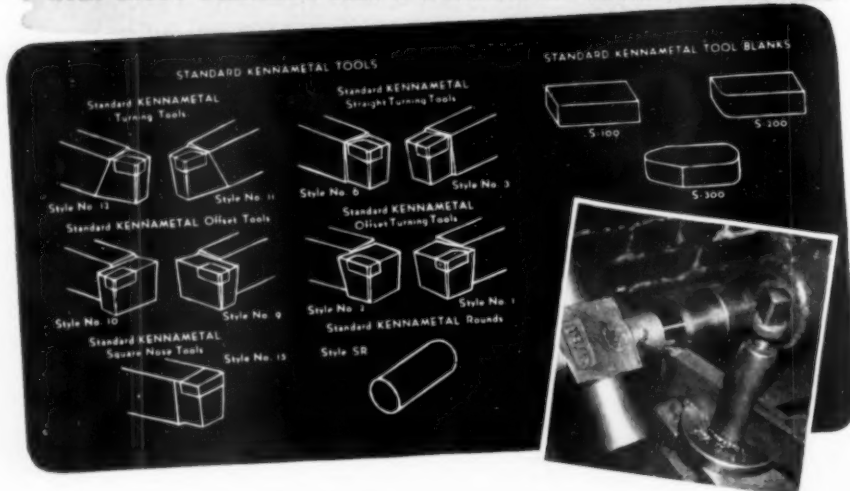
the valve lever can be linked to a moving part of the machine for automatic synchronous operation. Another function of these motors is as prime movers for supplying fractional horsepower for such operations as tube flaring, punching, broaching, stamping, die casting, and bushing insertion.

The motor also has dual exhaust ports that provide for selective utilization of the exhaust air blasts for ejecting work pieces, cleaning out chips, and permitting adjustment of speed of one or both strokes. Available in standard models with strokes of 1½, 2½, 6,

**Senacon  
air motors  
open and close  
holding fixtures.**



**9 out of 10 steel-cutting jobs  
CAN BE HANDLED QUICKLY and CHEAPLY  
with these standard KENAMETAL\* tools and blanks**



The illustration shows ten standard styles of KENAMETAL tools. They will be found suitable for the majority of turning, boring, and facing operations on steels hardened up to 550 Brinell. Save time by using these standard tools, or by ordering KENAMETAL blanks and brazing your own tools.

All KENAMETAL tools are more economical and more efficient than ordinary ones. Their great hardness, wear resistance and crater-resistance makes them outlast other tools, and do more work in any given time.

Visit the KENAMETAL Booth C-110 at the National Metal Congress.

**\*INVENTED AND MANUFACTURED IN U. S. A.**



Get the facts about  
KENAMETAL!  
Write for a copy of  
the Vest Pocket Manual  
containing full  
details.



and 9 inches, these motors can be furnished in other sizes ranging from 1 to 18 inches on special order.

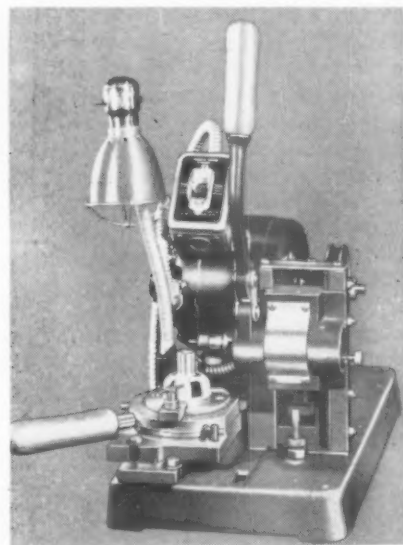
## INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 151.

## HAND MILLER

(H92)

A high speed ball bearing, motor driven bench machine suitable for handling light cuts in brass, aluminum, and similar materials has been developed by H. B. Rouse and Company, 2214 North Wayne Avenue, Chicago. Through the



**Rouse Hand Miller  
Has adaptable spindle.**

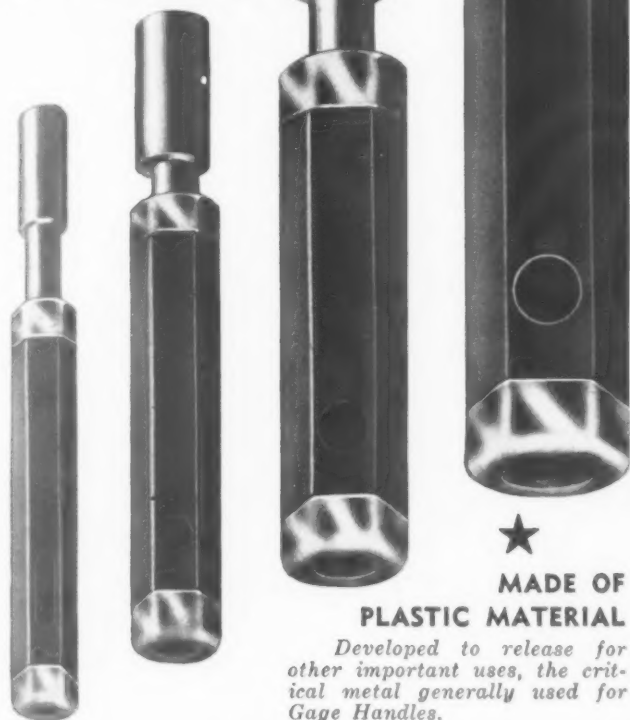
use of special fixtures for each type of work, this machine is said to be capable of high production. It can be used on small parts for radios, electric motors, airplanes, and similar equipment.

The spindle is adaptable so that either small circular milling cutters or small end mills can be used on the machine.

**THE TOOL ENGINEER**



# FEDERAL TAPER LOCK GAGE HANDLES



MADE OF  
PLASTIC MATERIAL

*Developed to release for other important uses, the critical metal generally used for Gage Handles.*

## ACCURATELY MADE...

They conform to standard dimensions for gages, accepted throughout the industry. Plastic material protects gages from bodily heat, helping to safeguard their accuracy.

## LIGHT IN WEIGHT...

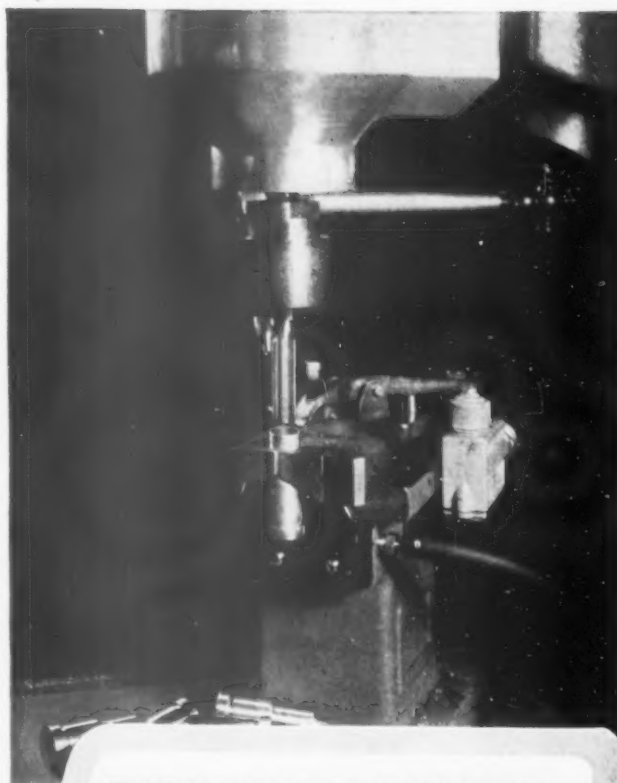
Made of durable plastic material, much lighter than metal. This permits greater sensitivity to touch, and reduces fatigue from long continued use. Marked with the same lettering stamps that are used for metal handles.

## LOW IN COST...

About half the cost of metal handles—a real saving. They are available without delay, in any quantity.

**FEDERAL TOOL  
CORPORATION**

402 North Leavitt Street - - Chicago, Illinois



**PIECE PART CONTROL**  
*Helps You*  
**Control Costs**

**T**HIS Air Vise Fixture with Piece Part Control—a Haskins development—greatly speeds up the precision tapping of these time fuse bodies of cold rolled steel. The operator places the part in the fixture to start the tapping cycle and everything else is automatic—even the ejection of the tapped part!

Haskins developed fixtures are one important reason why Haskins Tappers are making such valuable contributions to war production now—and why these same standard machines can be so quickly and inexpensively converted to private industry production when Victory is won! R. G. Haskins Company, 2756 W. Flournoy St., Chicago.



NEW BOOKLET — "Holding Fixtures for Haskins Tapping Machines" — contains many new ideas. Send for a copy.



**HASKINS**

*Precision*  
**TAPPING  
EQUIPMENT**

—NEW EQUIPMENT—

## ALLOY SPRAYER

(H93)

Offered by the Alloy-Sprayer Company, 2040 Book Building, Detroit, a new self-contained and portable metal atomizer is claimed to be capable of spraying any neutral alloy which has a melting temperature of up to 600 degrees F. This sprayer is recommended for use in making templates, spotting or checking dies, and reproducing molds.

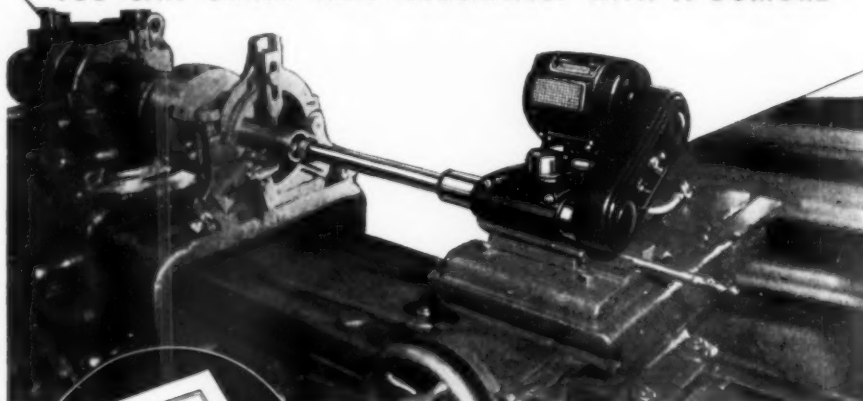
Requiring only connecting-in with electric power and factory air pressure line for operation, this sprayer is said



**New Alloy Sprayer**  
Temperature range of 100 degrees.

*1/44 the thickness of a postage stamp*

YOU CAN GRIND THAT ACCURATELY WITH A DUMORE



### Write For This Helpful Instruction Book On Precision Grinding

Maintenance of tools is a vital wartime necessity. For this reason, the Dumore Company now offers this practical handbook FREE if requested on your company letterhead. Regularly priced at 25 cents.

rough cuts, yet finish to an accuracy of .0001" . . . 1/44 the thickness of a postage stamp. The Dumore tradition of quality is based upon a quarter century of research in precision grinding and the highest standards in material and craftsmanship. Call on Dumore to help you in your war production problems. See your nearest distributor, or write today.

THE DUMORE COMPANY 222K Racine, Wisconsin



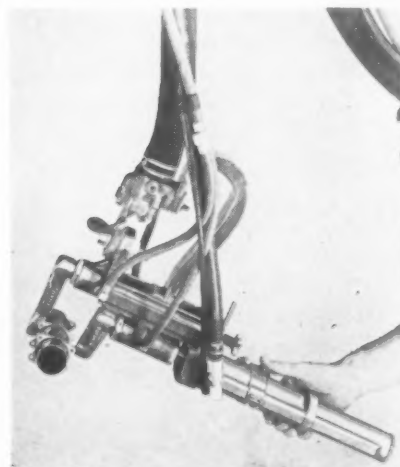
# Dumore PRECISION Grinders

to be especially suitable where accuracy of reproduction is so fine that even pin scratches must be reproduced and where the same operation needs a high speed of depositing metal for backing-up purposes.

Illustrated is a 12 cubic inch capacity model and is equipped with electrical elements for heating the metal. A rheostat switch knob varies the temperature over a range of 100 degrees, depending on the alloys used.

## INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 151.



**Progressive Welding Gun**  
Used for low pressure welding.

## LOW PRESSURE WELDING GUN

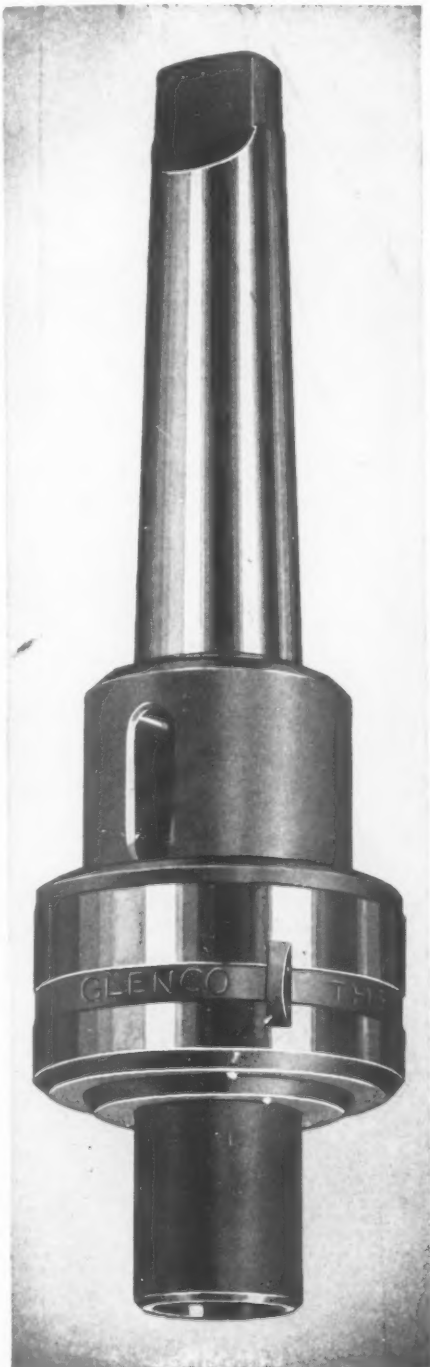
(H94)

Because light welding pressure is required when welding brackets or clips to light gauge alloy steels in order not to deform the metal, a gun for such welding operations has recently been introduced by the Progressive Welder

# GLENCO

## FLOATING TOOLHOLDER

Corrects Machine Tool Misalignment By  
Producing TRUE and ACCURATE Holes



Also Manufacturers of

**McKinney**  
Tool

FLOATING  
HOLDERS  
SPOTFACERS  
COUNTERSINKS

REAMERS  
COUNTERBORERS  
LIVE CENTERS  
SLEEVES  
TAP CHUCKS  
DRILL CHUCKS  
ADJUSTABLE  
ADAPTERS

ADJUSTABLE  
EXTENSION  
ASSEMBLIES  
QUICK CHANGE CHUCKS  
EXTENSION SOCKETS  
SPACING COLLARS  
ARBORS  
END MILLS  
WOODRUFF CUTTERS  
CORE DRILLS

THE J. C. GLENZER CO.  
DETROIT MICHIGAN



Only by **"DOING"** . . .  
can you **"KNOW HOW"**



...and **McKINNEY** has been **"DOING"**  
for 20 years!

It takes plenty of "know how" to solve some of the production problems that face manufacturers these days. And there's no time for experimentation or guesswork.

So when you need design and engineering help call upon an *experienced* firm . . . The McKinney Tool & Manufacturing Co. . . to do the job.

Possibly we have solved your particular problem before and can give you the answer in a jiffy. If not, you can be sure that our long, and varied experience will enable us to analyze your troubles in record time and iron them out with a minimum of delay.

Because we are manufacturers . . . as well as designers and engineers . . . we've learned our "know how" first-hand. We invite you to use our plant as your laboratory for solving trying production problems.

### McKINNEY SPECIALIZED SERVICES

- Machine Designing
- Tool Designing
- Process Engineering
- Product Engineering
- Plant Layout and Routing for top efficiency.
- Designers and manufacturers of dies, jigs, fixtures and special machinery.

# McKINNEY

TOOL & MANUFACTURING CO.

1688 ARABELLA RD. CLEVELAND, OHIO

"DESIGN ENGINEERS



FOR TWENTY YEARS"



Company, 3050 E. Outer Drive, Detroit. Operating pressure of the gun is hydraulic with partially counterbalancing continuous air pressure.

Screw-adjustable stroke up to 3 inches to take care of a wide range of work sizes and quick interchangeable adapters for electrodes to make the gun suitable for a variety of work shapes, are said to be features of this new gun. P-H concentric kickless and flexible welding cables and electronic controls are used in the complete assembly. Illustration shows a close-up of the gun.

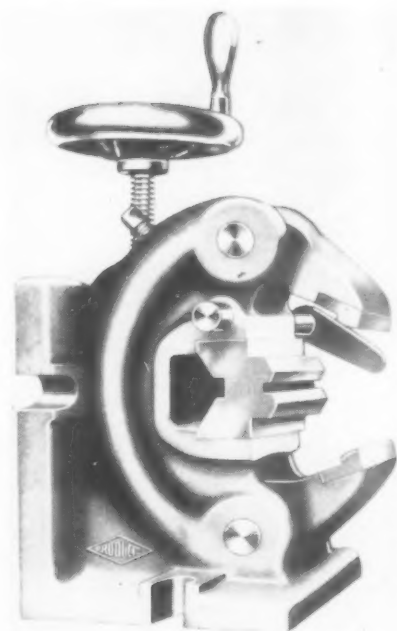
## INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 151.

### SELF-CENTERING SHAFT VISE

(H95)

A self-centering shaft vise to hold spindles or shafts for such operations as keywaying, slotting, or splining, is now being manufactured by The Pro-



**New Producto Vise**  
Has self-centering shaft.

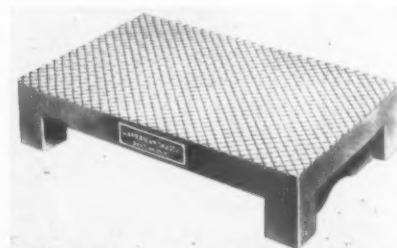
ducto Machine Company, Bridgeport, Conn. Made for vertical or horizontal mounting on the machine table, both bases of the vise are accurately machined at right angles.

Centering of the work for all sizes within the capacity of the vise is accomplished through the work being held against a hardened V block by equal movement of two jaws controlled from an operating screw. Handling shafts or spindles  $\frac{3}{8}$  inch to  $1\frac{1}{8}$  inches diameter, the vise has an adjustable stop for locating work lengthwise. The hardened V block is reversible for small and large work.

### LAPPING PLATE

(H96)

A new lapping plate, 8 inches wide,  $12\frac{1}{2}$  inches long, and  $2\frac{1}{2}$  inches high has just been designed by the American Gauge Company, 128 Bayard Street,



**New Lapping Plate**  
Has deep grooves.

Dayton, Ohio. The cast iron block is about  $1\frac{1}{8}$  inches thick and mounted on four legs. The surface is cut with  $1/16$  inch grooves in a diamond pattern.

11  $\frac{1}{8}$ " Rack Shifter Shaft

IT'S MADE OUT OF  
**SPEED TREAT STEEL**  
A MEDIUM HIGH CARBON OPEN HEARTH PRODUCT

—because . . .

Speed Treat increased production 25%

Speed Treat greatly improved finish

Speed Treat saved \$17.75 per ton of steel used

Ductility  
Plus  
Machinability  
(170 SFPM)

In this "all-out" war effort Monarch Steel is co-operating 100%.  
We're helping to "keep 'em rolling" with Speed Treat Steel.

Licenses for Eastern States  
**THE FITZSIMONS COMPANY**  
YOUNGSTOWN, OHIO

Licensor  
**MONARCH STEEL COMPANY**  
HAMMOND • INDIANAPOLIS • CHICAGO  
PECKOVER'S LTD., Toronto, Canadian Distributor

MANUFACTURERS OF COLD FINISHED CARBON AND ALLOY STEEL BARS

**SAY....**

**Goodbye to Scrapped Parts  
In Tapping and Reaming!**

**HOW TO  
AVOID SPOILAGE LOSSES**



**Fits Any  
Machine**

Furnished with male or female taper, straight, threaded or special shanks to fit any machine used for tapping or reaming.

Write for  
CATALOG

If spindles are out of alignment with the work, spoilage losses are bound to be great because of bell-mouthed or oversize holes—and inaccurate tapping. Not so, however, if you use a Ziegler Roller-Drive Tool Holder—the tool holder that automatically compensates for spindle misalignment.

You'll be amazed at how it floats! Never any friction or cramping under the severest tool-driving strains. Holds to the finest tolerances. Pays for itself over and over in the spoilage it saves.

**W. M. Ziegler Tool Co.**  
1920 Twelfth St.  
Detroit, Mich.

*Ziegler*  
ROLLER  
DRIVE

**FLOATING HOLDER**  
for Taps and Reamers...

**PRODUCTION SCREW DRIVING  
REQUIRES THESE MODERN MACHINES**

*3 Models*

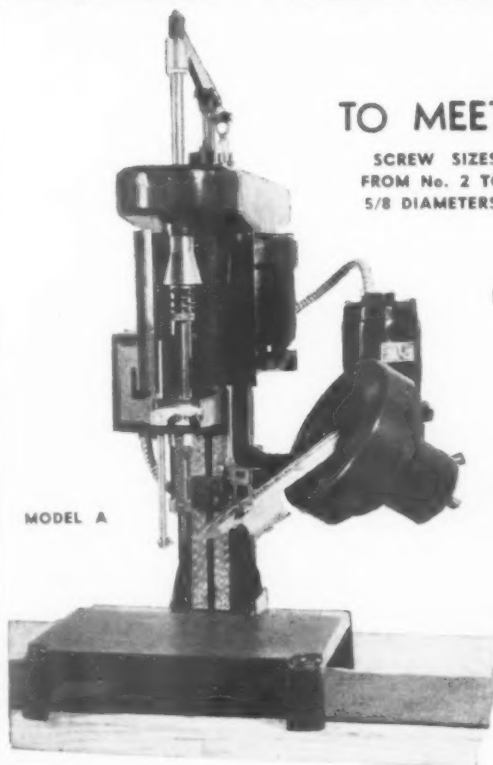
**TO MEET ALL REQUIREMENTS**

SCREW SIZES  
FROM No. 2 TO  
5/8 DIAMETERS

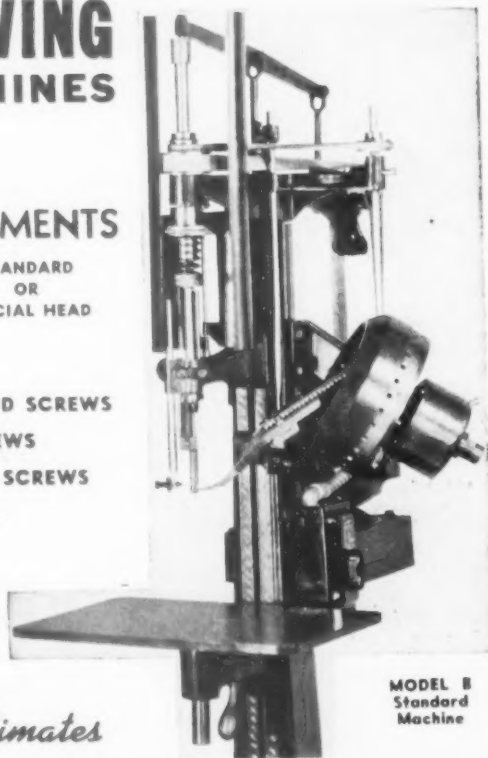
STANDARD  
OR  
SPECIAL HEAD

MACHINE SCREWS • WOOD SCREWS  
SELF-TAPPING SCREWS  
PARKER-KALON SPECIAL SCREWS  
Types A, U, & Z

*Send Samples  
for  
Production Estimates*



MODEL A



MODEL B  
Standard  
Machine

**DETROIT POWER SCREWDRIVER CO.**

2805 W. FORT STREET

DETROIT, MICHIGAN

These grooves are spaced  $\frac{1}{4}$  inch and are at right angles to each other, but 45 degrees to the length and breadth

### INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 151.

of the plate. This is claimed to give them a superior cutting action when the object is lapped on the plate.

The grooves are cut deep so that surplus lapping compound will not accumulate on the surface of the plate. The lapping plate surface is first ground and then lapped until it is said to be accurately flat.

### MASTER TRI-SQUARE

(H97)

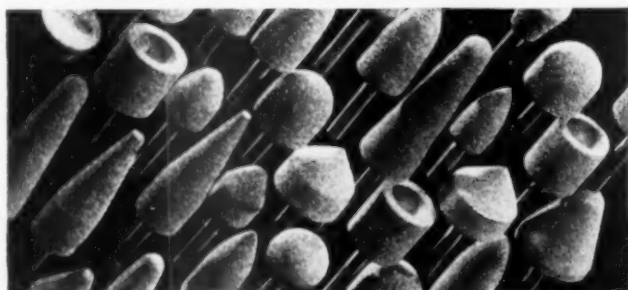
Held to limits said to be hitherto unattained, a master tri-square has just been produced by the Jansson Gage Company, 19208 Glendale Avenue, Detroit. It is of one-piece construction and is said to be suited to extreme precision

measurement wherever 90-degree angles are involved.

This tri-square is available in two sizes, 4 inches in height with a  $\frac{5}{8}$  inch wide standing base and 6 inches high with a 1 inch wide base, and is held to limits of .00002 inch base and side. The final manufacturing operations on this square are done in a special temperature control room to assure gaging accuracy. It is hardened, ground, and lapped from alloy tool steel and is provided with an insert hard fibre serrated grip to prevent heat transference and slipping in handling.

The square is claimed to be a basic gage for inspection departments and is used in laying out and checking right angle work and square surfaces, the checking of V's, straight flat edges and parallelism of cylindrical surfaces.

## POLISH 'EM OFF WITH



### They're TOUGH and DO Their STUFF!

Commandos of the grinding wheel industry — the first small wheels mounted on steelshanks and leading the way today with smoother, more rapid grinding, polishing and finishing of difficult jobs.



Chicago Mounted Wheels — the result of 45 years of KNOW HOW — come in a wide range of styles on different size shanks, for use with any portable or flexible shaft grinder. Several special-formula abrasives give 150% to 300% longer service. More than 200 shapes, all mounted and rarin' to go.

### HI-POWER GRINDER

A real production tool — a 3-pounder with enough power to drive a 2 $\frac{1}{2}$ " diameter wheel. 17,000 r.p.m. In case with accessories, \$38.50.

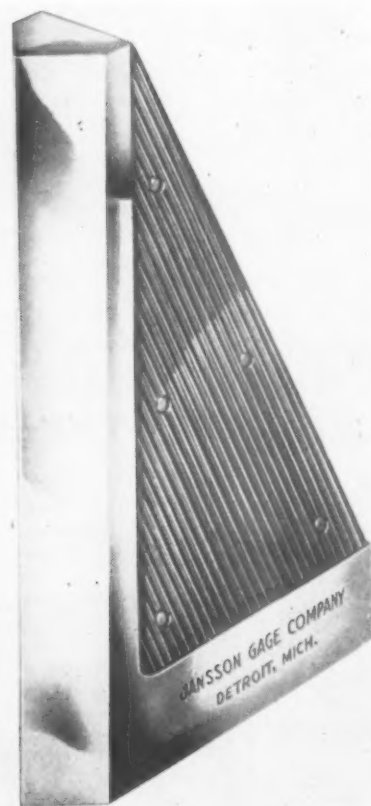
**LATEST CATALOG** Packed full of comprehensive information and pictures. You'll be interested. Send for copy.

**CHICAGO WHEEL & MFG. CO.**  
Makers of Quality Products Since 1896  
1101 W. Monroe St., Dept. TE, Chicago, Ill.

### TEST WHEEL FREE

If you have a grinding problem, send for a Survey blank, which you'll find easy to fill out. Upon its return, our abrasive engineers will analyze it and send you without charge the trial wheel they recommend for your particular job.

<input type="checkbox"/> Send Hi-Power	<input type="checkbox"/> Catalog	TE-10
<input type="checkbox"/> Free Wheel Size		
Name .....		
Address .....		



Jansson Master Tri-Square  
Available in two sizes.

### DRILL PRESS

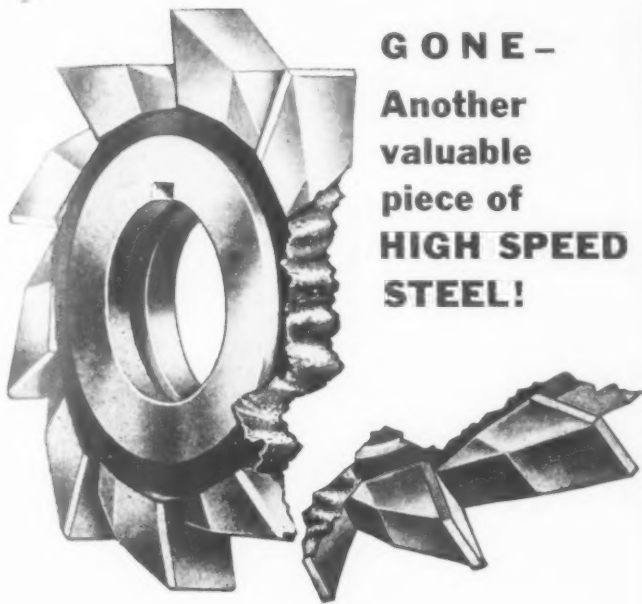
(H98)

A new super sensitive drill press for extremely small drills and other tools has been announced by the Edward Blake Company, 634 Commonwealth Avenue, Newton Centre, Mass. It has a standard range of 8 speeds from 3000 to 23,000 rpm, thus giving the proper surface speeds on drills from .004 inch to 1/16 inch in diameter.

Designed by engineers said to be

**THE TOOL ENGINEER**





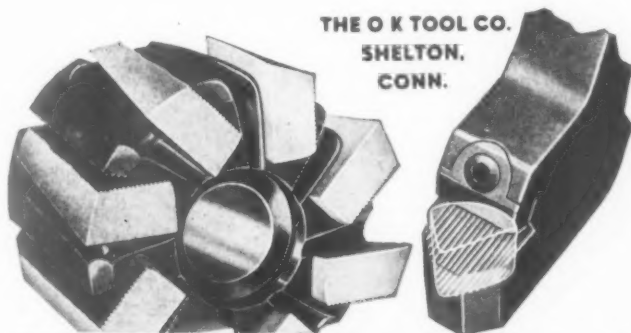
**GONE—**  
Another  
valuable  
piece of  
**HIGH SPEED**  
**STEEL!**

If a solid cutter breaks, it can seldom be reliably repaired. It's gone—and with it the use of a valuable piece of H. S. Steel . . . a metal that is growing daily more scarce.

There is no reason for milling cutters and lathe and planer tools to be made entirely of HIGH SPEED steel, for only the blades do the cutting.

This is taken care of perfectly in O K Tools, and has been for many years. Here only the blades of the multiple cutters and the bits of the single-point tools are made of the expensive cutting steel. The bodies, whose sole job is to provide strength, are of drop-forged steel, ruggedly proportioned.

In peace, the O K System will declare dividends in any factory. In this war of survival, its use is a very material contribution to Victory.



THE O K TOOL CO.  
SHELTON,  
CONN.



**SYSTEM**  
OF INSERTED-BLADE METAL CUTTING TOOLS

OCTOBER, 1942

**AMES**  
*Shockless*



*Hundred Series*  
**DIAL INDICATORS**

For tough jobs, where hammer-like blows at the spindle end break down ordinary indicators, AMES Shockless Indicators stand up and give uninterrupted service. The addition of a simple shock-absorber to the wheel assembly protects the gear train without changing the outside dimensions or appearance. Unlike any other indicator cushioning device, it is absolutely effective, does not reduce accuracy or sensitivity and saves repair expense.

Try some of the various sizes and models on your most punishing testing jobs and see how they will keep on checking fractions of the thousandth inch just as accurately after being pounded and jolted severely.

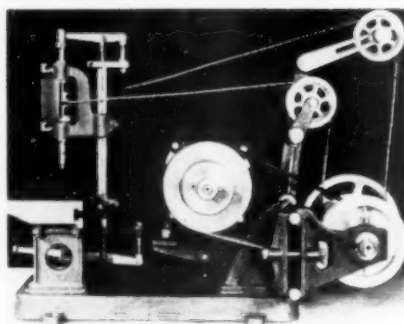


**B. C. AMES CO.**  
WALTHAM, MASS.

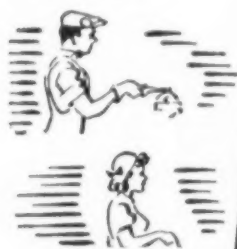
## —NEW EQUIPMENT—

familiar with the requirements of watch and instrument making, sensitivity in this drill press is attained by balancing the spindle by means of the vertical component of the belt tension. This sensitivity, plus finger-tip control, is said to reduce drill breakage to a minimum.

One, two, three, and four spindle machines may be furnished, each spindle with an independent finger-tip control. Each spindle may be run at an independent speed to suit the size and type of tool being used and the material to



**New Drill Press**  
For extremely small drills.



## Finger-Tip or Push-Button CONTROL of MASSIVE MACHINE MOVEMENTS

### with NOPAK Operating VALVES

The application of air or fluid power to heavy, cumbersome machine movements is giving old machines new life, new usefulness, greater capacity to meet war production quotas.

NOPAK Air or Hydraulic Cylinders controlled by NOPAK Operating VALVES are used to actuate clutches, chucks and clamping devices; to move or hold materials, dies or tools in position on highly diversified machine operations. Physical strain and exertion are replaced by push-button, foot-pedal or finger-tip control. The elements of human error and fatigue are minimized. Skilled labor is released for more exacting work, as inexperienced men or women are readily trained to operate your modernized equipment.

If you have machines in your plant that might be converted to push-button or fingertip operation, write today for complete data on NOPAK Control Valves, NOPAK Air and Hydraulic Cylinders.

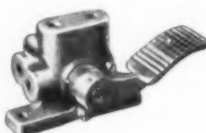
GALLAND-HENNING MFG. CO.  
2757 S. 31st Street • MILWAUKEE, WIS.

# NOPAK

VALVES and CYLINDERS  
DESIGNED for AIR or HYDRAULIC SERVICE

Representatives in Principal Cities

NOPAK 3- and 4-Way Hand Control Valves are known for their easy, finger-tip operation on air or hydraulic installations.



NOPAK Foot-Operated Control Valves require very little pressure to operate, are available in 2-, 3- and 4-way types for various operating cycles. Leave operator's hands free for other duties.



NOPAK Solenoid Valves, 3- and 4-way, facilitate push-button, automatic or remote control of single or double acting cylinders on many types of equipment.

## —NEW EQUIPMENT—

be cut. Standard equipment includes two spindles for each spindle mount, one for Jacobs chuck and one with a tapered hole for tapered shanks.

### LOCATING AND CENTERING TOOL (H99)

Said to be particularly effective in accurately centering layouts to spindle, an entirely new type of locating and centering tool has just been announced by the Center Master Division of the Center Scope Instrument Company, 351 South La Brea Avenue, Los Angeles.



**New Centering Tool**  
Centers layouts to spindle.

It is claimed that this new tool reduces the number of steps necessary in locating and centering work to spindle and adapter run-out, and because it is easier for the operator to center his work lines between the scribed lines on the locating glass. The overall length of the tool is 3 1/4 inches with 3/8 inch spindle shank 1 inch long. It has a knurled trimmed screw for compensating run-out.

### INFORMATION FREE

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### MEASURING INSTRUMENT (H100)

A new type of comparator has been

THE TOOL ENGINEER

BRAEBURN ALLOY  
STEEL CORPORATION  
(Pittsburgh District)  
BRAEBURN, PA.

## Bonded Carbide, Sr.

Super-Cobalt  
High Speed  
Steel

### Chemical Analysis

Carbon .70	Chromium 4.50	Vanadium 1.50	Tungsten 18.00	Cobalt 10.00	Molybdenum .70
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### Heating Instructions

#### FORGING

Cool slowly after forging, in silocel, lime or ashes.

1800 To 2050°F.

#### ANNEALING

(Brinell 235/269)

1650°F.

#### HARDENING

Preheat

1500 To 1550°F.

High Heat

(Quench in Oil or Air)

2350 To 2390°F.

Draw

1050 To 1100°F.

### Hardness Data

Draw 2380°F.

Oil

As Quenched

C-65

1050°F.

C-64 To C-65

1100°F.

C-63 To C-63.5

1125°F.

C-62

1150°F.

C-61

1200°F.

C-58

### Applications

Heavy Duty Lathe, Planer and  
Boring Tools for Cutting Cast  
Iron and Steel and Heat Treat-  
ed Alloy Steel Forgings.

WRITE FOR LITERATURE

**BRAEBURN ALLOY STEEL CORP.**

**BRAEBURN, PA.**

## FOUR WAYS TO SPEED UP TO VICTORY

(FOUR WAYS TO SAVE TIME AND MONEY)

### ✓1 TUNGSTEN CARBIDE LATHE AND GRINDING CENTERS

Circle Tip Tool Company's centers are equipped with a hard wear and gall resisting metal, lasting from 50 to 100 times as long as high speed steels. Standard sizes in stock, special centers made to order.

### ✓2 TEN STANDARD CARBIDE TIPPED TOOLS

Available for immediate shipment in two grades of "Tamaloy," a new Tungsten Carbide, Circle Tip standard tools are finished ground, ready for use, or may be reground to meet your particular cutting problems.

### ✓3 "TAMALOY" CARBIDE BLANKS

"Tamaloy" blanks can be furnished in special shapes approximately .015" oversize, allowing you to make your own form tools. Standard "Tamaloy" blanks from stock.



HIGH RESISTANCE TO ABRASION

### ✓4 SPEEDALOY

Speedaloy is a cast cutting alloy made of a special Tungsten Chromium alloy. It fills the breach between high speed steels and Tungsten Carbide in both performance and price. Speedaloy comes in solid Tool bits, flats and tipped tools.

CATALOG AND PRICES ON REQUEST

**The CIRCLE TIP TOOL COMPANY Inc., EAST ORANGE, N.J.**



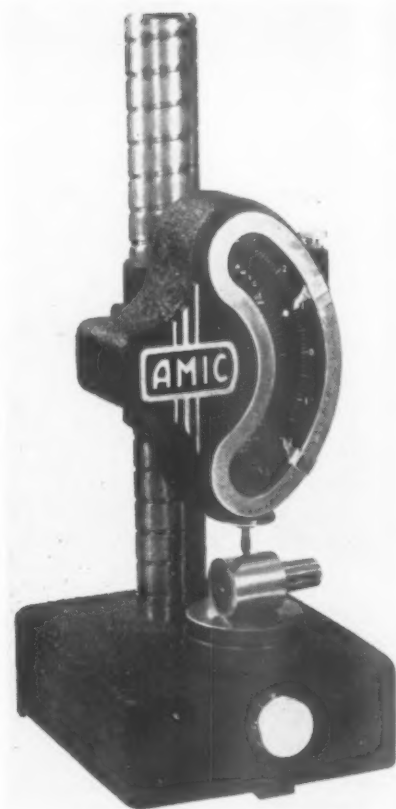
recently announced by American Measuring Instruments Corporation, 40 West 22nd Street, New York City. It is mounted on a machined square cast-iron base into which is built a parallel ground and lapped table. The table has vertical micrometer adjustment for setting the comparator to zero position by means of a master gauge or Johanson block.

This instrument has a working height capacity up to 12 inches, a throat depth of 4 inches, and by swiveling the head, a working circle of 10 inches. The

magnification is 1:1000. .001 inch displacement of the measuring pin causes the hand to move one inch on the dial. Deviations as small as .00002 inch are said to be detected. Its total capacity is .003 inch.

#### INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 151.



New Measuring Instrument  
Total capacity is .003 inch.

Another feature of this AMIC comparator is a disk mounted on the axis of the indicator hand rotating in a permanent magnetic field which brings the hand to immediate rest.

#### METAL CUTTING COOLANTS

(J1)

Offered in a wide range of container sizes; 3, 5, 15, 30, 50, and 55 gallons, a new line of metal cutting coolants has been developed by the Gray-Mills Company, Chicago. Called "Flo-Bac" coolants, they are manufactured in four types to cover practically every requirement. These new coolants are said to be companions to this company's line of portable coolant systems.



New Gray-Mills Coolants  
Wide range of container sizes.

THE TOOL ENGINEER

# INCREASE *your* OUTPUT

and save wear on your machines

## WITH SUTTON COLLETS

PATENTED  
DIAMOND SERRATIONS  
Grip Tighter...  
Self-Cleaning

Self-Cleaning—Dirt, chips and scale work out more easily through diamond serrations. This exclusive Sutton feature reduces wear, thus increasing collet life and giving you more production with less scrap.

Grip Tighter—Diamond serrations take horizontal and rotating thrust at an angle, and therefore hold work with a much tighter grip than rectangular serrations. Diamond grip collets take heavier cuts without slipping.

**SUTTON TOOL COMPANY**  
2895 W. Grand Blvd. • Detroit, Michigan  
SEE OUR REPRESENTATIVE  
or send for Catalog No. 14A

COLLETS • FEEDERS  
MASTER COLLETS AND PADS  
MASTER FEEDERS AND PADS  
PARTS AND ACCESSORIES  
for lathes, milling machines,  
hand and automatic  
screw machines

# SUTTON



# COLLETS

*Time The Operations!  
Compare The Results!*

and you'll see why  
more and more war industries are using



WELDON ROBERTS  
**Brightboy**

"The Soft Rubber Binder Cushions the Abrasive"

*for*

FINISHING  
DE-BURRING  
POLISHING



Smoothing and de-burring dural and stainless steel welded part with Bright-boy Wheel.

**B**RIGHTBOY'S unique and effective action is neither a grind nor a buff. It is the in-between "ideal" finish that production men have hoped for—now *achieved* by Brightboy. Unsurpassed for close tolerance finishing. The wheels de-burr, polish and put on a slight radius all in one operation. Special shapes have innumerable applications in manual work and drill press jobs. Available to war industries only—through recognized mill supply distributors. Bright-boy field men are at your service. Write for catalogs and prices if your distributor cannot supply you.

1. NO "TIMEOUT" CHANGES IN METHODS. Brightboy is used in the conventional manner.
2. NO SPECIAL TRAINING NECESSARY.
3. NO SPECIAL PREPARATION. Ready for immediate use.
4. NO WASTE. Every bit is usable.

BRIGHTBOY  
INDUSTRIAL DIV.

WELDON ROBERTS  
RUBBER CO.

Newark, N. J., U. S. A.

WHEELS • STICKS • BLOCKS • TABLETS  
RODS • SPECIAL SHAPES



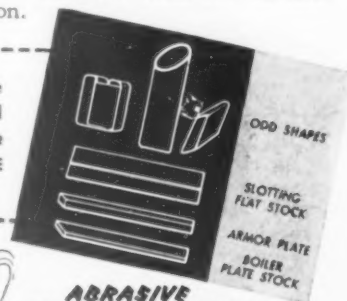
*Your CUTTING JOBS are Different?*  
ANOTHER REASON FOR SEEING WHAT CAMPBELL  
ABRASIVE CUTTING MACHINES CAN DO FOR YOU

Take just a moment to check off these "variables" to see where your cutting fits in.

- HARDNESS?** CAMPBELLS are cutting materials that range from dead soft annealed to unannealed alloys.
- BURNING?** Cuts tool and alloy steels without burning or hardening.
- SHAPES?** Solid bars to 6" in diameter. Tubing. Odd shapes. Flat stock. Square or to any desired angle.
- ACCURACY?** Micrometer set cuts.
- FINISH?** Clean, free from burning, mirror-like. Eliminates finishing operation.
- COSTS?** Great savings by using CAMPBELLS.
- WHO USES?** Thousands of well organized plants. For example, with America at war, CAMPBELLS are cutting parts for Aircraft, Aircraft Engines, Propellers, Army Trucks, Cars and Tanks; Machine Guns, Bombs, Shells, Small Arms Ammunition, Projectiles, Field Telephones.

Ask to have a Campbell engineer show you what you can gain by using a **CAMPBELL ABRASIVE CUTTING MACHINE**. No obligation.

• Some of the different shapes and materials cut on one **CAMPBELL ABRASIVE CUTTING MACHINE**



**Campbell**  
ABRASIVE  
CUTTING MACHINES

ANDREW C. CAMPBELL DIVISION  
BRIDGEPORT • CONNECTICUT



In Business for Your Safety

**AMERICAN CHAIN & CABLE COMPANY, Inc.**  
BRIDGEPORT • CONNECTICUT

## COOLANT PUMP

(J2)

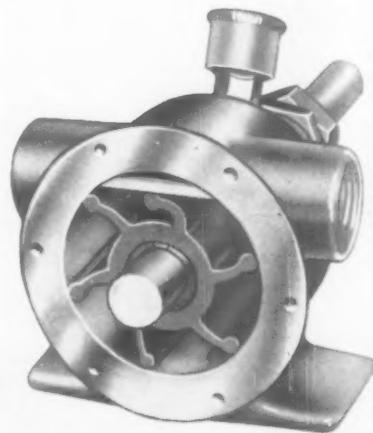
Said to have but one moving part, a new type of self-priming pump has just been announced by the Jabsco Pump Company of 8302 Wilshire Boulevard, Beverly Hills, Cal. It is recommended for the handling of coolants that may have been contaminated with abrasives and is designed to pump either thick or thin coolants.

It is claimed that the pump does not require priming each time the machine is started. A single Neoprene synthetic

rubber impeller is the only moving part which fits inside the pump housing and creates a near vacuum. All the other parts are of bronze and it is said that there are no adjustments to make and no gears to clog.

According to the manufacturer, one feature of the pump is the fact that the impeller allows a certain amount of solids to pass through. Installed on milling machines, lathes, tappers, and other machine tools, it can be mounted at any angle and can be operated in either direction. It is available in 1/4 to

3/4 inch sizes with capacities from 2 1/2 to 22 gallons per minute.

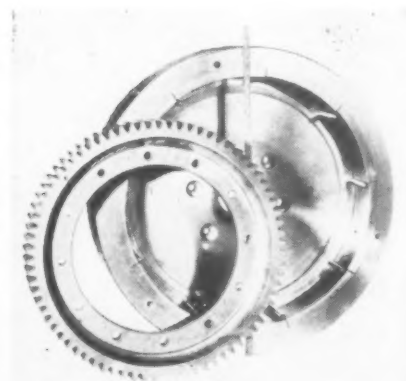


**Jabsco Coolant Pump**  
Has but one moving part.

## GEAR CHUCK

(J3)

Said to be a practical gear manufacturer's solution to the problem of holding spur or helical gears for hub, hole, or face grinding, a new speed chuck has been developed by Charles Cotta, 1712 Harlem Avenue, Rockford, Illinois. Because the gear is simply set in the chuck where a slight turn causes it to be gripped firmly by a set of hardened and ground pitch-line pins, it is claimed that loading and unloading time is reduced to a minimum.



**Cotta Gear Chuck**  
Gear simply set in the chuck.

for LESS SCRAP in your plant and more "Scrap" on the fighting front!



SOLID TYPE

**TUNGSTEN CARBIDE** tipped standard reamers by Super Tool are the best that money can buy—and the most economical from every point of view.

They cut faster, cleaner, truer. They save time and reduce scrap—hold their size over extremely long runs—give you more production, and speed the stuff out to our fighting men.

Many standard sizes in stock for quick delivery—in semi-finished

Straight Shank Taper Shank

form for completion to your sizes. Send us your inquiries and ask for Bulletin R-1.

# SUPER TOOL CO.

21640 HOOVER RD.

DETROIT, MICH.



## CARBIDE TIPPED TOOLS

FOR TURNING - FACING - REAMING - SPOTFACING - BROACHING  
FORMING - GRINDER RESTS - WEAR PARTS - BORING - MILLING - DRILLING  
GROOVING - COUNTERBORING - SHAVING - CENTERS - SPECIAL PURPOSES

## CORRECTION

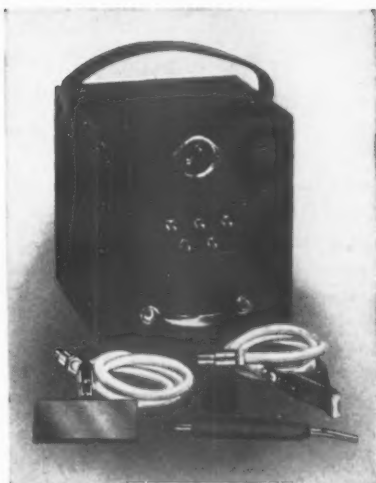
The "Precise" 35 small grinder, Item (H 66) in the New Equipment section of the September issue is manufactured by the Precise Products Corporation of Racine, Wisconsin. The Paul F. Hermann Company is the Eastern distributor for this product.



Mark Iron,  
Steel and  
Carbides the

*Etchograph*  
Way

2000 IN USE



NEW JUNIOR MODEL

**Buy the Original Electric Etcher**

Three sizes to meet all requirements. Also  
a combined Etchograph and Demagnetizer.

**With New ELKONITE TIP Pencil**

Mark hardened parts, tools, dies, gages and  
fixtures of any ferrous metals including the  
hardest alloys and carbides — quickly —  
plainly.

*Write for circulars and prices.*

**BREWSTER-SQUIRES COMPANY**

54 Church Street

NEW YORK, N. Y.

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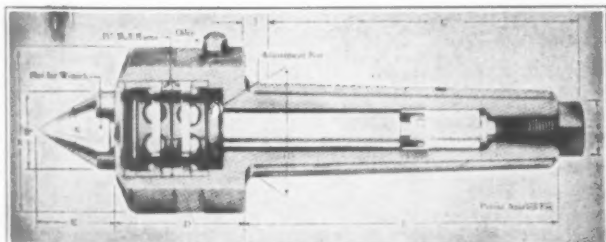
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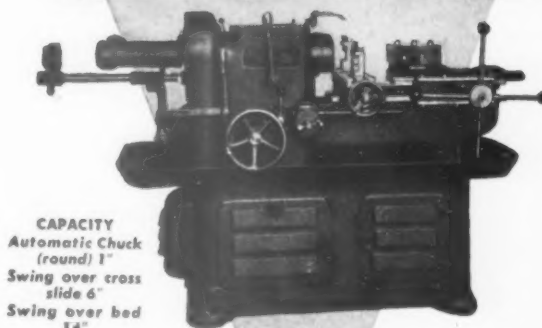
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# NEW LITERATURE . . . . .

Of Interest to Production Executives



## (512) Machining Aluminum

*Machining Alcoa Aluminum.* 44 pp. Aluminum Company of America, Pittsburgh. Setting forth the general principles of machining aluminum and its alloys, this booklet suggests speeds, feeds, and depths of cut which will produce satisfactory results. It points out where practices and tools common to other metals may be used and indi-

## INFORMATION FREE

To receive booklets listed in this section, place key number of desired literature and your name and address on postcard on page 151 and mail to The TOOL ENGINEER.

cates where special practices or tools are desirable. Part I deals with general

machine shop practice while Part II describes the practices employed in automatic screw machine operations.

## (513) Mounted Wheels

*Mounted Wheel Manual.* Chicago Wheel & Manufacturing Company, 1101 West Monroe Street, Chicago. Said to be more than just a catalog, this piece of literature contains detailed instructions on the operations of mounted wheels and accessories for portable equipment. Contents include a selection guide which gives information on the application of mounted wheels. A section is devoted to the new mounted polishing wheel. This booklet is illustrated with exact size and color illustrations.

## (514) Press Brakes

*Cincinnati Press Brakes.* 64 pp. The Cincinnati Shaper Company, Cincinnati, Ohio. This new piece of literature, a treatise on press brakes and their uses, is largely devoted to pictures showing press brake applications, bending and punching load charts, features for special work, and pages of dies and their uses. These machines are said to be widely used in the manufacture of combat tanks, airplanes, and ships. Every page is full of illustrations of the presses and the actual work they are doing.

## (515) Degreasing Solvent

*Perma-A-Clor Always First Among Degreasing Solvents.* Detroit Rex Products Company, 13005 Hillview Avenue, Detroit. This company has just issued two new illustrated leaflets that describe this type of degreasing solvent under adverse operating conditions. Said to be non-inflammable, this chlorinated solvent is used for cleaning all kinds of metal parts.

## (516) Grinding

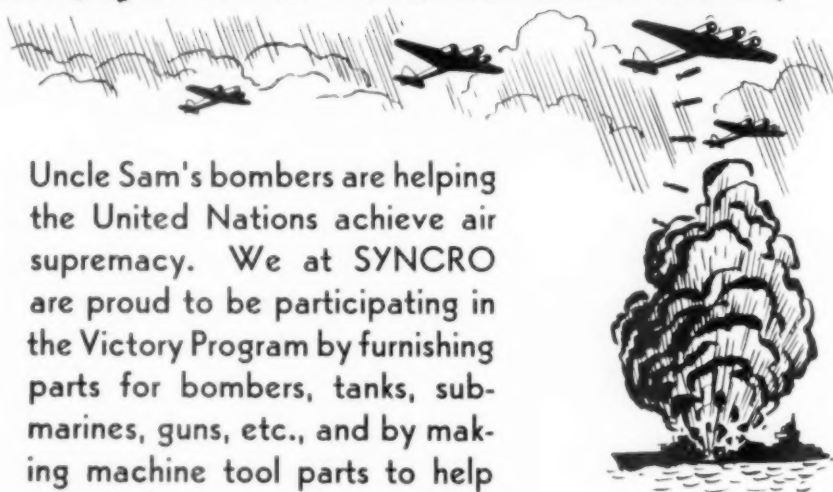
*How to Use Internal Grinding Diamond Wheels for Cartridge Dies.* 4 pp. Smit & Sons, Inc., New York City. This illustrated folder gives information regarding these miniature diamond wheels for rough and finish grinding of these tools. Such subjects as mounting, speeds and feeds, and coolants are discussed.

## (517) Cutting Screw Threads

*How to Cut Screw Threads in the Lathe.* 21 pp. South Bend Lathe Works, South Bend, Indiana. The setting up of a lathe for thread cutting is discussed in the first part of the booklet. Information is given on the various

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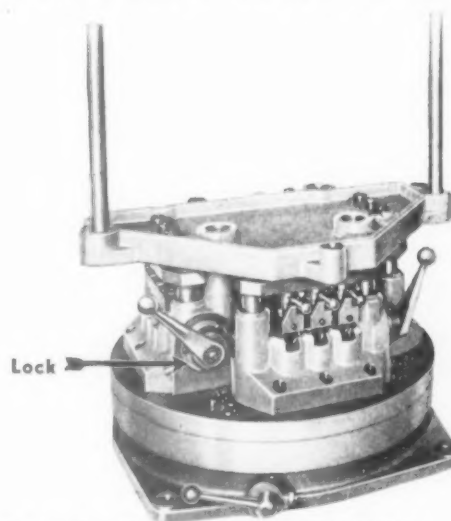
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types of lathe tools used in cutting screw threads. Also mentioned is the method of grinding and how they should be mounted and positioned. Formulae and diagrams of standard screw thread forms are included. Also explained are the uses of the center gauge, compound rest, thread cutting stop, thread dial indicator, taps, and dies.

**(518) Cutting Tools**

*New Blue Book on Firthite.* 44 pp. Firth-Sterling Steel Company, McKeesport, Pa. This catalog lists standard

tools, general-purpose tools, and standard tips. The various styles are illustrated and are cataloged as to style, size, class, grade, and price.

**INFORMATION FREE**

To receive booklets listed in this section, place key number of desired literature and your name and address on postcard on page 151 and mail to **THE TOOL ENGINEER.**

**(519) Boring Mills**

*Cincinnati Hypro Vertical Boring and Turning Mills.* 24 pp. The Cincinnati

Planer Company, Cincinnati, Ohio. This new bulletin describes and illustrates the various types of this machine. Also illustrated and described are the main drive and bed construction, the table and drive, the feed and rapid traverse, the threading and drum scoring, the cross rail, and the taper attachment. A chart showing the electrical equipment to be used is included.

**(520) Vise**

*Studebaker Hydraulic Drillvise.* 4 pp. Studebaker Machine Company, 9 South Clinton Street, Chicago. Illustrations in this new folder show various applications of this foot-controlled vise. It includes a drawing of the vise and controls with an explanation for each part. The use and construction of the vise are described and complete specifications are listed.

**(521) Positioners for Welding**

*C-F Positioners for Faster, Better, More Economical Welding.* 16 pp. Cullen-Friestedt Company, 1318 South Kilbourn Avenue, Chicago. This illustrated bulletin describes the new practice of welding on positioners. It includes pages of typical welding jobs with descriptions of position welding methods.

**(522) Gaging**

*Gaging Policy.* 15 pp. The Sheffield Corporation, Dayton, Ohio. This new booklet is a supplement to *Dimensional Control*, published earlier this year by the same corporation. Fully illustrated with working drawings, charts, and graphs, this booklet includes important factors of gaging policy, gage makers' tolerances, allocation of gage tolerance, wear allowance, and Army Ordnance practice. It tells how to order plain gages, snap gages, or thread gages.

**(523) Bronze Electrodes**

*Ampco-Trode 10.* 6 pp. Ampco Metal, Inc., Milwaukee, Wisconsin. Describing in detail an all-purpose, coated bronze electrode, this new bulletin contains the physical properties, chemical composition, procedures for various types of welding with this type of electrode. Detailed instructions are given for using this electrode on the metallic arc welding of cast manganese bronze, Muntz metal, and brass. Included in this bulletin are a number of diagrams showing methods of welding, deep groove preparation, building up metal on vertical surfaces, weaving sequence, and method of depositing beads.

**(524) Hydraulic Presses**

*Hannifin Sensitive Pressure Control*

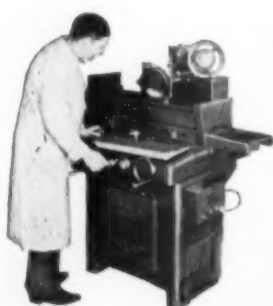


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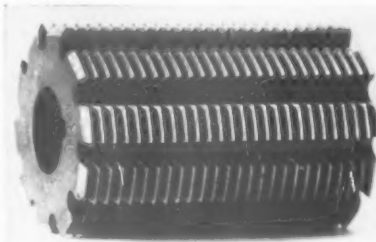
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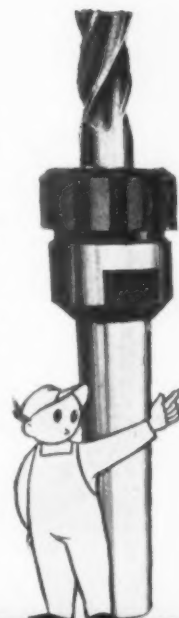


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*Hydraulic Presses.* 4 pp. Hannifin Manufacturing Company, 621-631 South Kolmar Avenue, Chicago. This new bulletin illustrates the various types of presses made by this concern. Each is described and the specifications given. The cycle of operation of the control used with these presses is described and illustrated. One page is devoted to other products manufactured by this company such as hydraulic and pneumatic cylinders, hydraulic and pneumatic riveters, arbor presses, valves, and a tool room machine.

### INFORMATION FREE

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#### (525) Surface Grinding

*Mattison High-Powered Precision Surface Grinder Set-Ups.* 46 pp. Mattison Machine Works, Rockford, Illinois. This piece of literature is full of examples of grinding work done on this

concern's machines. All examples are illustrated and described. Such subjects as way grinding, breech block grinding, and radius grinding are among the many mentioned in this bulletin. The grinders are illustrated and complete specifications are given.

#### (526) War Time Work

*The Hobart Group.* 20 pp. Hobart Brothers Company, Troy, Ohio. This booklet explains the products, manufacturing and engineering facilities, and war time activities of this group of companies. This new piece of literature shows some of the uses of this concern's products in war and peace time work. Illustrations are included.

#### (527) Metal Duplicating

*The Di-Acro System of Metal Duplicating Without Dies.* 34 pp. O'Neil-Irwin Manufacturing Company, Minneapolis, Minnesota. This new catalog is a revision of a similar one published by this company in March, 1942. This new catalog includes two new and additional Di-Acro Products; the No. 3 brake with 18 inch capacity and the No. 2 shear of 9 inch capacity.

#### (528) Oil

*Houghton's Hydro-Drive.* 8 pp. E. F. Houghton & Company, 303 West Lehigh Avenue, Philadelphia. This new illustrated booklet outlines the necessary qualities of an hydraulic oil and describes what this company has done in that respect with their Hydro-Drive "MIH" series of hydraulic oils. Oxidation Stability is discussed and examples of performance are given. Several pages are devoted to the laboratory research done in connection with this type of hydraulic oil.

#### (529) Assembling Aircraft Skins

*Prestite, the Safe Skin Holder.* 2 pp. Prestite Devices, Toledo, Ohio. This leaflet describes and illustrates a new fastener for aircraft skins. Working drawings which show the fastener in finished position are included. Illustrations show how the pliers used for this operation work. Also given is a chart which lists the rivet size, drill size, maximum finished hole diameter, maximum thickness sheet material, and the assembly plier tool for each size of fastener.

#### (530) Drop Compass

*Toolmaker's Compass.* 6 pp. Ithaca Scientific Instrument Company, Ithaca, N. Y. Describing and illustrating the various parts of the compass, this folder shows the proper method of using the drop compass manufactured by this concern. Drawings show how to set

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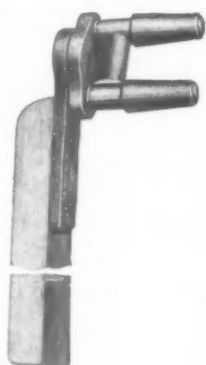
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the radius and how it is used as an hermaphrodite scriber.

#### (531) Grinding Wheels

*Grinding Wheels—Their Construction and Selection.* 26 pp. Mid-West Abrasive Company, 1960 East Milwaukee Avenue, Detroit. This new illustrated data booklet contains photographs and sectional diagrams of grinding wheels, honing and superfinishing stones manufactured by this concern. Said to be educational in character, it tells how grinding wheels and other solid abra-

sives are made and what they are made of. Also included are tables and charts detailing grain and grade specifications, recommended grinding wheel speeds, minimum spindle diameters and wheel weights, and some functional facts of grinding wheel operation. Other tables include those on wheel selection and wheel markings.

#### (532) Gear Finishing

*Red Wing Shaved Gears.* 12 pp. National Broach and Machine Company, 5600 St. Jean, Detroit. Why gears

should be shaved is a typical topic discussed in this new bulletin. The principle of crossed axis shaving is mentioned. Specifications are listed, photographs of the machine and the various types of work being done are included, and working drawings of cross axis cutting plain gears, cross axis cutting close shoulder gears, crossed axis contact are given.

#### (533) Precision Tools

*Precision Production Tools.* 54 pp. Acme Tool Company, 200 Church Street, New York, N. Y. Completely indexed, this catalog gives the specifications, describes, and illustrates surface plates, live centers, vises, boring tools, lathe chucks, and many other types of tools sold by this concern.

#### (534) Bearing Metals

*Magnolia Bearing Metals.* 8 pp. Magnolia Metal Company, 18 West Jersey Street, Elizabeth, N. J. Said to be timely and helpful because of wartime restrictions on tin-base babbitts, this new bulletin describes various lead-base metals found to be excellent substitutes for this use. Practical suggestions for best results in making and maintaining journal bearings and a table of recommendations for selecting the correct type of bearing metal are features of this bulletin. It also describes Isotropic Bronze Bushings, die-cast by the crystal control method.

#### (535) Grinding

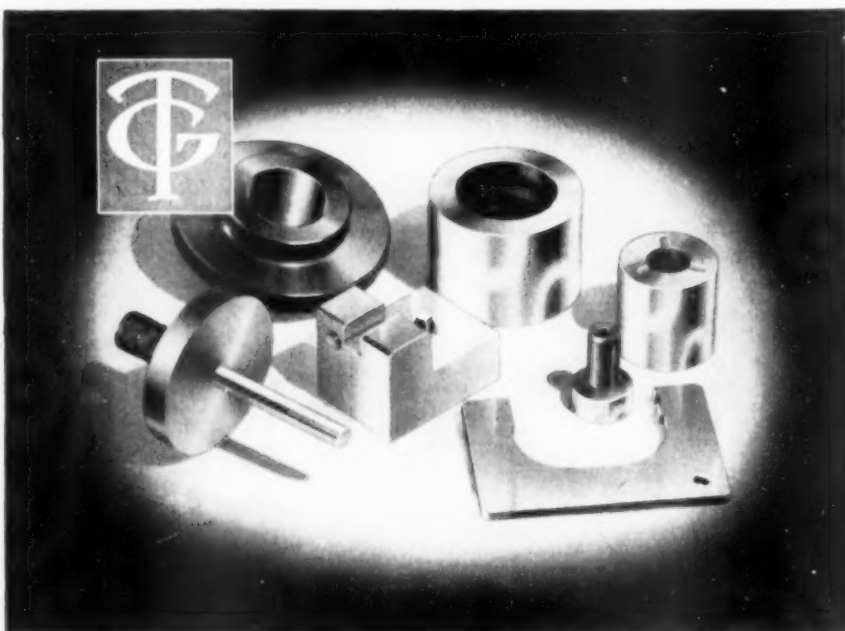
*Today—Ordnance Grinding, Tomorrow—Roll Grinding.* 6 pp. Norton Company, Worcester, Mass. Illustrated in this new folder is a Norton heavy ordnance grinder which has a 40-foot capacity between centers. Features of these grinders are described and specifications are listed. The fact that these machines are built so that roll crowning mechanisms can be added later is also brought out in this folder.

#### (536) Tool Guide

*The Stanley Tool Guide.* 32 pp. Price 25c. Stanley Tools, New Britain, Conn. This new handbook is directed to men and women learning the use of tools in school shops and industrial plants today. The booklet is conveniently step-indexed so that directions on each type of tool are easily found. All directions are carefully explained and are illustrated.

#### (537) Gage Handles

*New Taperlock Gage Handles.* 4 pp. Federal Tool Corporation, 417 North Leavitt Street, Chicago. This folder describes and illustrates these new gage handles. Material used in construction is mentioned and the prices are given.



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## AMERICAN SOCIETY OF TOOL ENGINEERS

As many of our members know, one of the parts of the work of the Educational and National Defense Training Committee is the selection of texts and the review of existing books on Tool Engineering.

Among our thousands of members, some must have read about all of the books that have been published on Tool Engineering.

We are, therefore, asking all of you to take part in this work. A form is printed herewith on which to report the accompanying list of books on Tool Engineering subjects. If you have read any or all of these books, please fill out the form (or a "reasonable facsimile thereof") and send it to either one of the following addresses:

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Your service will be much appreciated by the hard-working reviewers, and will supply a cross-section of our members' opinions—a valuable check on our reviewers' work.

(Signed) FRANK MARTINDELL,  
Sub-committee Chairman.

**JIG, FIXTURE AND GAGE DESIGN AND PRACTICE**  
TOOL DESIGN, by C. B. Cole  
PRACTICAL DESIGNS for Drilling & Milling Tools, by C. W. Hinman  
TOOL ENGINEERING (Jigs and Fixtures), by Dowd & Curtis  
TOOL ENGINEERING (Punches, Dies and Gages), by Dowd & Curtis  
JIG AND FIXTURE DESIGN, by F. D. Jones  
JIGS AND FIXTURES, by Colvin and Haas  
ECONOMICS OF TOOL ENGINEERING, by Gwiazdowski and Lord  
I.C.S. BOOKLETS:  
TOOL DESIGN, 6 booklets, 2535 A, B, C, D, E, F, by John A. Jay  
JIG AND FIXTURE MAKING, 5100, by I.C.S. Staff  
JIGS AND FIXTURES, 5099, by I.C.S. Staff  
MACHINE SHOP PRACTICE AND CUTTING TOOL DESIGN  
MACHINE TOOL OPERATION (Drilling, Planning, Milling, Grinding), by Burghardt  
MACHINE TOOL OPERATION (Lathe, Bench, Forge), by Burghardt  
RUNNING AN ENGINE LATHE, by Colvin  
MANUAL OF LATHE OPERATION & Machinists' Tables  
CARE & OPERATION of Machine Tools, by Barritt  
MACHINE TOOL WORK, by Turner  
MACHINE SHOP TRAINING COURSE, (Vol. 1 & 2), by F. D. Jones  
GRINDING PRACTICE, by Colvin & Stanley  
COLD METAL WORKING, by Van Leuven  
DRILLING & SURFACING PRACTICE, by Colvin & Stanley  
GEAR CUTTING PRACTICE, by Colvin & Stanley  
TURNING & BORING PRACTICE, by Colvin & Stanley  
ENGINEERING SHOP PRACTICE, (Vol. 1 & 2), by O. W. Boston  
WHAT STEEL SHALL I USE? by G. T. Williams  
MACHINIST OF METALS, Lectures  
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PLASTIC WORKING of Metals & Power Press Operation, by Crane  
PRESS WORK PRESSURE, by C. W. Lucas  
FORGING PRACTICE AND DIE DESIGN  
THE WORKING OF METALS, Symposium by American Society of Metals  
FORGING HANDBOOK, by Naujoks  
FORGING PRACTICE, by Johnson  
I. C. S.:  
MACHINE FORGING, Parts 1 & 2  
FORGING DIES  
SPECIAL FORGING OPERATIONS  
FORGE SHOP EQUIPMENT  
MAKING FORGING DIES  
HAND FORGING  
TOOL DRESSING  
PERMANENT MOLDING PLASTICS AND DIE CASTINGS  
PLASTIC MOLDING, by Rahm  
DIE CASTING PRACTICE, by Stern  
DIE CASTING, by H. L. Chase

DIE CASTING—Machines, Dies, Alloys, by Herb  
READY REFERENCE FOR PLASTICS

### WELDING EQUIPMENT AND METHODS

MANUAL OF ELECTRIC ARC WELDING, by Hubert  
OXYACETYLENE WELDING MANUAL, by Campbell  
FUNDAMENTALS OF WELDING, by Owen  
PROCEDURE HANDBOOK for Arc Weld Design  
THE SCIENCE and Practice of Welding, by A. C. Davies  
FOUNDRY PRACTICE AND PATTERN MAKING  
ELEMENTARY FOUNDRY TECHNOLOGY, by L. A. Hartley  
FOUNDRY WORK, by R. E. Wendt  
FOUNDRY WORK, by Simpson, Gray & Grennan  
STEEL CASTING, 1, 2, 3, by I.C.S. Staff  
FOUNDRY EQUIPMENT, 1 & 2, by Scott & I.C.S. Staff  
FOUNDRY CHEMISTRY, by Loudonbeck & MacFarlane  
FOUNDRY SANDS & Refractories, by Dietert & I.C.S. Staff  
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INDUSTRIAL ORGANIZATION & Management, by Davis

## AMERICAN SOCIETY OF TOOL ENGINEERS

### BOOK REPORT • DATE

TITLE

AUTHOR

PUBLISHER

DATE OF PUBLICATION

MATHEMATICS REQUIRED:— ALGEBRA • PLANE GEOMETRY  
TRIGONOMETRY • SOLID GEOMETRY • ADVANCED ALGEBRA  
ANALYTIC GEOMETRY • CALCULUS

LATEST MATERIAL

CLARITY — Good, Fair, Poor • TABLES — Complete, Fair, Few  
ILLUSTRATIONS & DIAGRAMS — Ample, Sufficient, Poor

SCOPE — Very complete, Good, Fair, Limited • PROBLEMS—Yes, No  
CLASSIFICATION — Text Book, Correspondence Course, Reference

NOTE: Cross OUT words which do NOT apply.

REMARKS: A brief summary of contents and an appraisal of the value of the book:

REVIEWER'S NAME

ADDRESS



## HANDY ANDY says:

T.M. REG. U.S. PAT. OFF.

WELL, I'm back from vacation, the Bramsons—Mr. and Mrs.—having sold me on the *ideal* spot. For that matter, I also found traces of the John Markstrums among the dunes.

The place, Watervale Inn, up near Frankfort, Michigan, is the modernized reincarnation of an old lumber camp. There are miles of beach, with

your choice between the warm charm of Herring Lake and the cool, green rollers of Lake Michigan.

Me, I delved in the ruins of a past empire and communed with the spirits of pioneers and roistering lumberjacks, laid the foundation of the Great Novel. (Any advance orders?) But outside of that, I just relaxed, ate of the lotus (?) and quaffed deep of the

waters of forgetfulness. And I mean water, not Scotch.

Coming back, I skirted beautiful Crystal Lake and revelled in the beauties of Beulah, basking on its shores. Then through Interlochen, its lute stilled for the season; said lute, incidentally, having been denied expression by an ex-barkeep who, with *Il Duce* aspirations, would arrogate control over America's music.

Then home! And east, west, hame's best, even if you do have to get up to go to work in the morning. But then, the daily grind's the easier for a bit o' diversion; now, I'm all pepped up and rarin' to go.

SPEAKING of vacations, I told you about one Ed Maples awhile ago, Ed having retired after many years as a tool room foreman at Midland Steel. A prime favorite in the Midland organization, Ed was presented with various remembrances on leaving.

Well, Ed sent me a snapshot recently, showing him and a granddaughter (?) seriously engrossed in piscatorial occupation. The remem-



Parlor piscatorial.

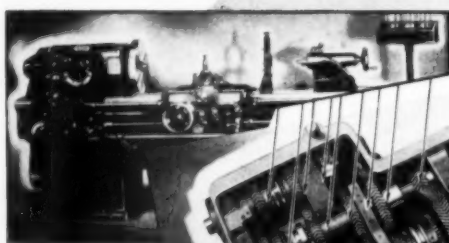
brances are all there—the boat with outboard motor, fishing tackle, wrist watch and cake, the latter handily disposed in the prow of the miniature Leviathan. Judging from the setting, it would seem Ed just couldn't wait for a formal launching.

Incidentally, Wally Herman, veteran A. S. T. Eer and long time tool room supt. at Midland, left shortly after Ed. Wally made the speech of presentation, and we're still undecided as to whether he was overcome by his own emotions or just wanted to go fishing, too, using his favorite bait—a can of peas. Anyway, fair weather to both Old Timers.

FROM ONE THING to another, this *Crib* that we started is in a fair way of becoming a permanent department of THE TOOL ENGINEER, although some of the boys seem to have missed its function. Ed Wiard, f'rinstance,

THE TOOL ENGINEER

## AMPCO "The Logical Alloy"



The Headstock of Sidney Lathes contains Ampco 18 in all looserunning gears, and also the center bearings on the spindle and intermediate shaft

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BEARINGS

Machine tool designing engineers, critical of the material which enters into each part of the equipment, have often chosen AMPCO METAL for vital parts subject to unusual wear and fatigue. Today 94 machine tool builders are Ampco customers.

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request.

AMPCO GRADE	TENSILE STRENGTH	YIELD STRENGTH	ELONGA- TION IN 2"	RED. OF AREA	BRINELL HARDNESS
12	65-75,000	25-29,000	22-27%	22-27%	109-124
16	70-80,000	32-37,000	18-22%	16-20%	131-156
18	77-85,000	34-40,000	10-14%	6-10%	159-183
18-22	90-100,000	45-55,000	3-7%	3-7%	202-235
18-23	95-105,000	43-50,000	10-15%	12-18%	183-207
20	83-90,000	38-43,000	2-6%	1-4%	212-248
21	70-80,000	42,000 min.	1-4%	0-4%	285-311
22	70-85,000	45,000 min.	0-2%	0-2%	321-352

AMPCO METAL, INC.

DEPARTMENT TE-10

MILWAUKEE, WISCONSIN

# AMPCO METAL

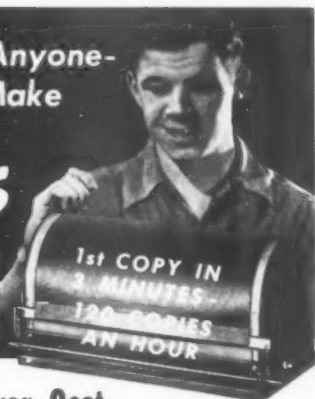


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When each of the 550 of us here at Universal helped give the Allied cause a boost by being America's first industrial plant to subscribe 20% for War Bonds we were mighty proud.

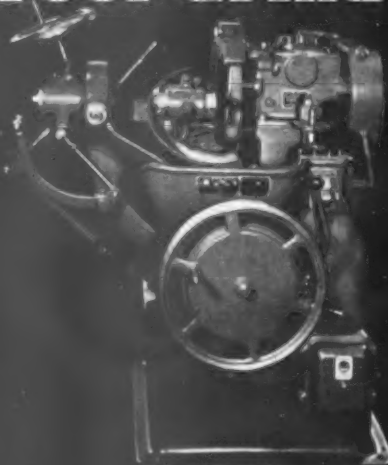
But we're even more proud of the big volume of precision built drill bushings we're turning out daily to help America's arms production.

Universal drill bushings (such as the one shown here) are straight and round with superfinished bores which assure accuracy and unexcelled wearing qualities. Write for facts.



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FRANKENMUTH • MICHIGAN

## Sellers 4T Tool Grinder



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**WILLIAM SELLERS & CO., INCORPORATED**  
1424 HAMILTON STREET, PHILADELPHIA, PA.



**Sellers**

of Gorham Tool, called me up and proposed a question and answers committee, the idea being that Tool Engineers with posers could refer them to the committee and get the solutions.

Well, that would be an ambitious undertaking, and personally, I'd hate to stick my neck out that far even if me and one other guy have all the answers. Anyway, I told Ed that that was the very purpose of *The Crib*, to act as a clearing house for the knotty

problems in production and tooling.

Send in your poser, and we'll refer it to the Committee of Ten Thousand, or, if you want things on the *q. t.*, we'll try to find the answer through private sources, no publicity.

At that, though, it might be a good idea if a Consulting Committee were appointed, in which case the guy with the idea might be the logical head. How about it, Ed?—shall I recommend you?

AMONG OTHER THINGS, I had a

letter from the Engineering Society of Detroit, implying that when 15 per cent of the local (Detroit) Chapter had been elected to membership we'd be eligible to affiliate Society membership, with privilege of representation in the Affiliate Council and other benefits, as use of the building, etc.

Incidentally, I was invited to become a member of the E. S. D.—provided I get four sponsors. Thanks!—I'll be right along (the provision provided) as soon as I get through my chores for this month's TOOL ENGINEER.

And, I'm naming Homer Bayliss, Prof. Boston, Jay Bowen and L. Clayton Hill as my sponsors, choosing the latter because he doesn't know me and risking the other three because they do. We'll see!

But seriously, it's a fine thing (the Affiliate Society membership, I mean—and naturally, the E. S. D.) and I'm for it. *E pluribus unum* and all that, you know.

▲ ▲ ▲

I SUPPOSE a lot of you boys around the country got quite a kick out of a recent article in *Life*, in which Detroit was panned plenty. But then, the local Tool Engineers—and shirt-sleeve executives in general—were duly appreciative, having come in for about the only praise the article bestowed.

Oh yes, we've done our bit (from "the middle") although we've missed the limelight a/c we haven't gummed up the works with strikes and picketing. If anything, I might remind *Life*—and our vote hungry politicians as well—that the Tool Engineers have been on the job from the very beginning, devising ways to offset time losses by groups that, apparently, put personal interests ahead of our country's needs.

Like the oft-mentioned Greek in the fable, we braided straw ropes for the jackass to eat, only, it happened that we braided faster than the critter could chew. But as for implying that we're not producing, I'd say that *Life* stretched truth to its elastic limits.

We are producing, in some cases ahead of schedule, but if we lag in other instances that is less the fault of Detroit's industries than of hamstringing by political red tape. And we'll have strikes and slowdowns in war plants until Washington decides that total war includes labor as well



*"Yes, it was a real engineering problem"*

Much of the responsibility for the changes that have taken place in industry lies here at our doors. In some plants we have designed new dies and fixtures; in others, we have laid out plants, selected and bought new machinery; in still others, we developed new methods of production; in many cases we utilized to a new purpose the equipment already in the plant.

This has been a gigantic program of plant conversion—and we are glad to have had a part in it. Our large staff of engineers is carrying on its share of this immense task to make sure that this country will still remain what we want it to be — A GOOD PLACE TO LIVE IN.

**PIONEER ENGINEERING**  
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leaves BOTH hands  
free for fast inser-  
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of work. Vise stays  
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Most important vise design in years! A fast-action, hard gripping air vise that speeds production; saves time, labor and costs! Speedy Air Vise operates from air line or individual compressor, exerting a grip of 15 times air pressure! Jaw opening adjustable up to a maximum of 3 inches. Maximum travel of  $\frac{1}{4}$  inch assures rapid insertion and removal of work. Employs no piston, but instead a long-life, multiple-type diaphragm... eliminating friction loss, air leakage and slippage. Rugged, compact, low priced, it is the ideal vise for speeding up numerous operations.

Write At Once For Circular E-10

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OCTOBER, 1942

**SIMPLIFIED INTERNAL GRINDING**



with the  
**MAJESTIC**  
**INTERNAL**  
**GRINDER**

An exceptionally wide range of internal grinding jobs can be handled on the New Majestic Internal Grinder. Its simplicity of design and ease of operation are features of utmost importance in providing maximum grinding output at low cost.

**SPECIFICATIONS**

Length of table, 48". Swing over table, 10". Travel of cross slide,  $2\frac{1}{2}$ ". Precision dial graduated to .0001". Precision bearing work head. Speeds—100, 225, 350 r.p.m.

Write for complete details contained in New Bulletin

**Majestic Tool & Mfg. Co.**  
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**Production Speeders**



**IDEAL**

**LIVE CENTERS**

**Turn Heavier Loads Faster**

They rotate WITH the work—and thus permit heavier loads—faster speeds—deeper cuts! Radial load carried by high precision ball bearing, and thrust load absorbed by a taper roller bearing.

**TRIPLE DUTY** 3 interchangeable center pieces for all centered and uncentered work. Save set-up time



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**IDEAL COMMUTATOR DRESSER COMPANY**  
4152 Park Avenue  
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SALES OFFICES IN ALL PRINCIPAL CITIES  
In Canada: Irving Smith, Ltd., Montreal, Quebec

as engineering and industry.

In this connection, it is my belief that the mass of American labor is patriotic enough and will produce if government backs it up. It's just a question of who's running the works, Uncle Sam or a minority of obstructionist screwballs.

I PERSONALLY wrote *Life*, and they printed the letter in part, although the meat was somewhat stewed up with the dessert. At that, it was good

journalism and may accelerate things—especially breaking bottlenecks.

Speaking of letters, Jack Buckley sent me a li'l billy doo, but whether from Philly or Worcester I can't make out, the letterhead implying the Quaker City the while he signed himself works manager of Worcester Chapter. How about it, Ed? Anyway, he proposes a two-some at the Semi-Annual, suggests a hitch hike down to Woonsocket and dear old So-Shall Willage. Well, we'll see.

Also had a letter from Jr. A. S. T. Eer Ira Franklin, Cpl. in the Royal Canadian Air Force. He's enthusiastic about this A. S. T. E. (they all are) and says that he now belongs to one of the finest skilled trades as well as the finest Society in this avocation. Well, Corporal, one more stripe and you'll be a sergeant, after which comes the commissions. And after that (the war won) you'll probably make Tool Engineering your vocation, when you'll see the A. S. T. E. as one of the finest *professional* groups. But thanks for the compliments, lad, and happy landings. May you drop your pineapple right on Hitler's Aryan (?) dome!



## Engineering 130 New Dies

### Time: 9 Days

Because LaSalle has the man-power as well as the "know-how," it is frequently possible to perform seeming miracles in helping our clients get into production on new items. For instance, not long ago a production change in one of the plants served by LaSalle called for 130 new dies to make the needed inter-related parts. Because we were able to break the job down to workable components, and because we had technical men in sufficient numbers to handle the job, designs were delivered in exactly 9 days.

All of this was accomplished without disturbing the client's regular engineering operations, which were occupied with other matters. Compared to the cost of recruiting the additional men for the brief time they were needed, our charges were negligible.

You can secure this same competent outside help, when and as you need it, by consulting LaSalle. Whether your problem involves a new product, or the tools to make it, or plant layout for more efficient production, LaSalle's experienced organization can produce results for you in minimum time. Write, wire or telephone for full details.



## LaSALLE DESIGNING CO.

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TOOL DESIGN • PLANT LAYOUT  
MANAGEMENT ENGINEERING

GETTING BACK to politics, we are told that we shouldn't criticise the Administration. Bad for morale, and all that, although it's my personal opinion that public morale would be somewhat improved if The Commander-in-Chief would sit on a few recalcitrant elements along with effecting a judicious change or two in the Cabinet.

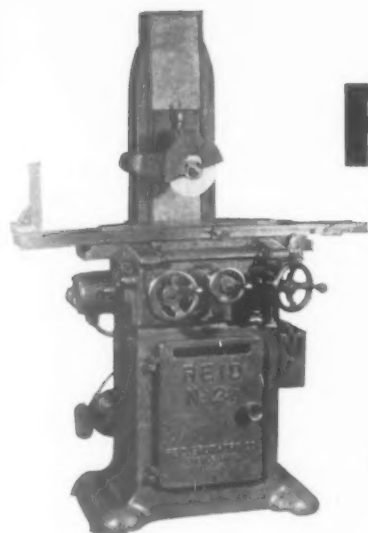
Anyway, constructive criticism is always in order, be it in peace or war, business or politics. Even carping criticism—although I've little use for it—can be a spur to a laggard body.

In the first bracket, we (editorially speaking) ran an editorial in *THE TOOL ENGINEER* a while back, saying that perfection should be subordinated to production. Oh sure, micro-inches and close tolerances for interchangeable parts, and all that, but a yardstick (figuratively speaking) where parts fit the empty air.

Now, at last, the Brass Hats are subscribing to that idea, with the very probable result that war production will be greatly accelerated. Now, if we could only get our politicians to let known production experts run war industries!

All nonsense, teaming 'em up with pants pressers or camouflaging 'em behind commissions. No, we want doers at the head of the industrial front, like this bird Kaiser who builds boats faster than Goebbels can lie, and gaining on production every day. And there's a lot more like him, rarin' to go but all trammelled up by red tape. Down with the barriers!—we've a war to win!

(Continued on page 202)



# THE REID

2B

**All Electric  
Automatic  
and Hand  
Feed Surface  
Grinder**

**T**HE Reid All Electric Surface Grinder is equipped with a motorized spindle, thereby eliminating all belts, pulleys, and counterweights. Table and cross slide are equipped with oil rollers, insuring greater life and proper lubrication. Table is operated with a silent chain instead of rack and pinion gears. Grinding capacity 6 x 18 x 11. Additional height if required on all standard machines. Send to Dept. O for descriptive literature.

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**with "HARDSTEEL" DRILL**

"With a 'HARDSTEEL' drill we now countersink more spring tempered steel trowel blades in two hours time than by former high speed steel countersinks in three 8-hour days—a saving of \$12.10 in wages alone while the operator has 22 hours left to do other work", writes Otto Heydrich, tool maker.

You, too, can drill, countersink, counterbore and ream hardened steels, hardened parts, dies, armor plate and other materials—Rockwell "C" 40 and harder—and do it faster, better, and cheaper with "HARDSTEEL".

New shop practice is:—harden first—then drill—to avoid misalignment of holes at assembly caused by heat treat distortion.

**You harden it — we'll drill it  
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OCTOBER, 1942



**S**ECOMET Resinoid Bonded Diamond Wheels can do your work more accurately, faster and without appreciable wear. They are most economical for sharpening cemented carbide and multi-bladed tools, such as milling cutters, broaches, etc. Moreover, their sharp, free-cutting action eliminates lapping and the usual semi-finish grinding operation. Catalog on request.

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JKS resinoid-bonded Diamond Wheels for internal grinding of tungsten steel cartridge dies, produce straight holes of mirror-like finish, accurately, speedily and economically. Roughing and finishing wheel diameter 7/16 in.; length 3/8 in.; bore 1/8 in. Special sizes to order. Consult a JKS representative or write for folder.

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# A. S. T. E. DOINGS . . . . .



## Boston

The first meeting of the season for the Boston Chapter was held on the evening of September 10th at Schraffts Restaurant in Boston. Gasoline rationing and tire shortage are having a serious effect on this Chapter as only 85 members were present. Dr. William MacGreagor Murray of M.I.T. was the speaker at the technical meeting. His talk and slides were on "Stress Analysis Through Photo-elasticity". Another feature of the evening was Henry Richards' "Movie of the Month" which was presented by Mr. Donald Ross of the Mystic Iron Works. "Bill" Young is arranging for a special car to take Boston members to the Springfield Convention. See Mr. Young for details.

## Buffalo

The Buffalo-Niagara Frontier Chapter held its sixth annual stag outing, Saturday, August 29th, at Walker's Grove in Williamsville, with about 300 members and guests present. The committee in charge of this outing was headed by Frank M. Wilson, general chairman of arrangements; Tom Goldsmith, tickets chairman; Jule Bemb, prize chairman; Henry Wild, games chairman; L. R. Gilbert, reception chairman; Al Kirchgessner, treasurer; and Howard Rose, publicity chairman. Those present at this outing took part in 27 different contests and games prepared and run off by the games committee. Among the high lights

were the base ball game and the egg throwing contest. Due to the war effort, many came in the early evening and contests were so arranged that full participation was enjoyed by all. With a complement of more prizes than ever before, distribution ran well into the evening.

## Columbus

The Columbus Chapter held its inaugural meeting of the 1942-1943 season at the Fort Hayes Hotel on the night of September 10th. Dinner was served at 7:15 and the business session was called to order at 8:00 P. M. Primarily a discussion and business meeting, no arrangements had been made for a speaker at this affair. Each member was asked as to the topic he would like to hear discussed at some future meeting. From this list cards will be printed of the various topics suggested. These cards will be passed out at the next regular meeting and will be checked by each member to give the vice president a definite idea of the kind of speakers to obtain for future meetings.

## Dayton

The Dayton Chapter opened its 1942-1943 program with a meeting at the Engineers' Club. There were 76 in attendance at the dinner. A business session was held before leaving the dining hall. The entire group then went to the auditorium where Mr. W. J. Blanchard, General Manager of the Aero Products Division, G.M.C. and

president of the Engineers' Club, gave a talk on "Aero Props."

## Detroit

Dr. Ralph L. Lee, of General Motors Public Relations Department, was the first speaker of the Fall season of the Detroit Chapter. At this meeting, held Thursday, September 10th, at the Spanish Grill of the Hotel Fort Shelby, Dr. Lee spoke on "Human Engineering."

## Elmira

The Elmira Chapter inaugurated its Winter season of monthly get-togethers with a dinner and meeting the evening of September 14th. Approximately 100 members and guests attended this event which was held in the main ballroom of the Mark Twain Hotel. The speaker of the evening was Adrian L. Potter, national executive secretary of the American Society of Tool Engineers. Mr. Potter discussed the value of the Society to its members and the part played in industry.

## Fond du Lac

The Northland Hotel, at Green Bay, Wisconsin, on the night of September 11th, was the scene of the dinner meeting of the Fond du Lac Chapter. One of the innovations of this Chapter is that the meetings will not always be held at one place, and it so happens that at this September meeting members and guests came from Green Bay, Kaukauna, Ripon, Sheboygan, Brillion, Fond du Lac and Milwaukee. Speakers for the evening were Mr. H. C. Baker, Sales Engineer of the Hudson Sharp Machine Company, Green Bay, Wisconsin and Mr. Don Fairbairn, Advertising Manager of the Hoberg Paper

## Boston Meeting in Jovial Mood



*Top left, John C. Tonkin, Instructor, U. of New Hampshire's machine tool lab.*

*Next, Ernie Vansaw, Chap. Secretary and T. E. for Simonds Saw, and Mr. Gilchrist of Simonds at Fitchburg.*

*Top right, Walter Pohle, TOOL ENGINEER contributor; George Sauter, pres. Cambridge Screw—Army and Navy "E" plant; Warren Ames, pres. B. C. Ames.*

*Below left, H. J. Richards, Chief Inspector, GE's Supercharger Plant. His story on gage control will appear in an early issue of THE TOOL ENGINEER. P. A. "Pete" Miller, Chairman Editorial Committee and super for Tubular Rivet & Stud and J. B. Savits of WPB.*

*Lower right, W. D. Rodrick, Chap Treasurer and Supervisor GE's River Works.*

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PRICE WITH ONE  
PUNCH AND ONE  
DIE—

**\$50.00**

Immediate  
Shipment

Built for hard  
tough work — die  
cannot lose align-  
ment with punch  
— all parts inter-  
changeable.

Capacity  $\frac{1}{2}$ " holes  
through  $\frac{1}{8}$ " steel;  
 $\frac{3}{8}$ " through  $\frac{1}{4}$ "  
steel. Can also be  
made for holes up  
to  $\frac{7}{8}$ " in thinner  
metal. Stock  
punches and dies  
available from  $\frac{1}{16}$ "  
to  $\frac{1}{2}$ " by 64ths.

Weight, 70 lbs.

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GROB Sawing  
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ines at work in a  
Detroit tool and  
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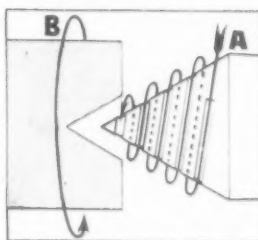
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GRAFTON WISCONSIN

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## Helical Groove CENTERS

**GIVE YOU ALL OF THESE  
COST-REDUCING ADVANTAGES**



\*The *exclusive* left-hand helical groove in the CMD Center serves two purposes. (1) It constantly conveys an ample supply of oil to the extreme point of the center and bearing surface of the work; and (2) It holds a reserve supply of lubricant which can be replenished without stopping the machine. Since the lubricant flows to the bearing surface in the same direction (see A above) as that in which the work is turning (see B), the capillary action draws the lubricant into the work.

### CMD CENTER POINT LUBRICANT

can withstand pressures greater than 50,000 lbs. per square inch— is considered by leading tool engineers the most efficient center point lubricant ever developed. Try it once! You'll use it regularly for lathes, grinders, screw machines, etc.

### ● GREATER MACHINE OUTPUT

The advanced design\* of CMD Helical Groove Centers assures more *complete* and *longer-lasting* lubrication of point and work. No more burned-out center points! No stopping machine to re-lubricate center! No readjustments of tail stock!

### ● RIGIDITY FOR PRECISION WORK

Because CMD Helical Groove Centers do *not* turn with the work, there are no rollers, balls, or races to wear out and throw the support for work out of alignment. The work turns on a film of oil, which is constantly replenished from the supply in the helical groove.

### ● LESS POWER CONSUMPTION

By reducing frictional heat to the minimum, CMD Helical Groove Centers prevent excessive expansion of work (a common cause of high power costs). The lubricant on work and in groove also helps to expel heat generated by cutting tools.

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Dept. 10T, 1928 West 46th St., Chicago, Ill.

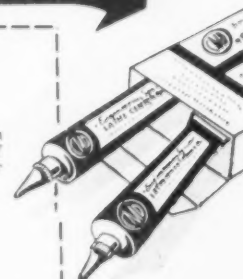
Send circular on CMD Helical Groove Centers

Without obligation to us, send FREE sample kit containing a tube of CMD CENTER POINT LUBRICANT and a tube of CMD CENTER POINT LUBE (grease) with directions for making an amazing, simple test.

NAME.....

FIRM NAME.....

ADDRESS.....



Mills at Green Bay, Wisconsin. Mr. Baker's remarks covered the topic, "Paper Mill Machinery." Mr. Fairbairn talked on "Manufacture of Paper" and showed an interesting film of the process of manufacturing paper from start to finish.

#### Los Angeles

Scully's cafe on the night of September 10th was the scene of the regular

work on an entirely new principle and have been used extensively on equipment used by our fighting forces.

#### Montreal

100 members and guests attended the first meeting of the 1942-43 season of the Montreal Chapter held at the Ritz-Carlton Hotel on September 9th. The guest speaker was Mr. Frank W. Curtis, immediate past President of the

#### Peoria

78 people attended the first meeting of the season for the Peoria Chapter which was held at the Creve Coeur Club. Otto W. Winter, national president, was present and gave an interesting coffee talk describing the importance of the Tool Engineer in the present emergency.

Mr. F. W. Burgie, Chief Engineer of the Doehler Die Casting Company, presented a lecture on the subject of die casting, the talk being supplemented by slides. The meeting was concluded by a movie depicting the manufacture of a modern bombing plane.

#### Pittsburgh

The Alooma Country Club was the scene of the first regular meeting of the season for the Pittsburgh Chapter on the evening of Friday, September 11th. The meeting was preceded by a golf match during the afternoon in which 35 members took part.

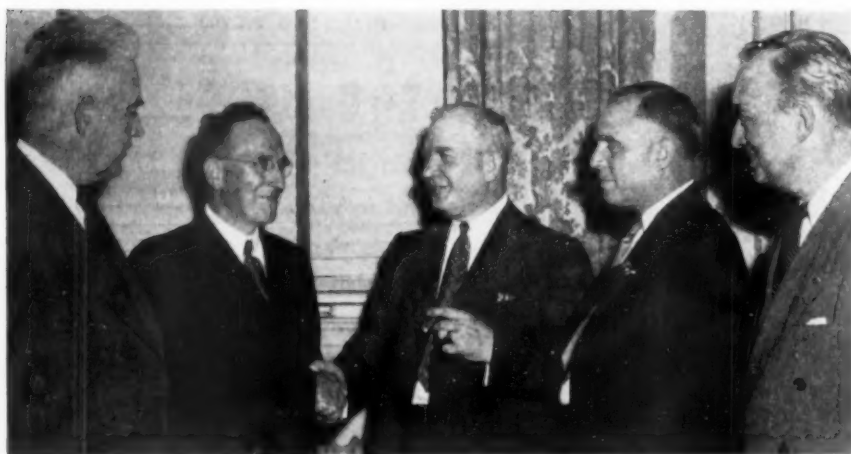
211 members and guests took part in the dinner and technical session in the evening. Gardiner Young of the Program Committee introduced the speaker of the evening who was Mr. J. D. A. Morrow, President of the Joy Manufacturing Company, at Franklin, Pennsylvania. Mr. Morrow spoke on employee relationships. Entertainment for the evening concluded with a floor show for the members. Mr. W. B. Pierce, chairman of the National Membership Committee, brought forty of his key men with him from the Flannery Bolt Company at Bridgeville, Pa. This was the largest single group brought by any of the members at the meeting.

#### Potomac (Washington, D. C.)

200 members and guests attended the meeting of the Potomac Chapter on the night of September 3rd at the George Washington University. The resignation of Mr. Raymond Harbst, chairman, was received and accepted. Mr. E. W. Seifert, vice chairman, succeeded to the chairmanship of the Society. Mr. Robert T. Plitt was elected first vice-chairman. Secretary, Mr. F. J. Rawson has entered the armed services of the country, and his duties are being distributed among other officers of the Chapter for the present. Two movies were shown during the technical session. The first was shown through the courtesy of The Cleveland Twist Drill Company and was entitled "The Use and Abuse of Twist Drills." Mr. F. A. Kelly, member of the Baltimore Chapter presided at an open forum discussion on drilling technique. Another film was in technicolor and entitled "Unfinished Rainbows" and was shown by the Aluminum Company of America.

(Continued on page 196)

### Attend Windsor Charter Night



Pictured above is a group which took part in the Windsor Chapter's Charter night on September 8th. Left to right: Frank R. Crone, national treasurer; Alan J. Norman, chairman of the new Windsor Chapter; E. C. Brandt, chief of Machinery Division, Automotive Branch, Detroit district of WPB; Clyde L. Hause, national secretary; and Adrian L. Potter, executive secretary.

meeting of the Los Angeles Chapter. Dinner was served at 7:00 o'clock and was followed by a talk on "Gaging Practices in Modern Industry" by Mr. Louis Lingler, of the Sheffield Corporation, Dayton, Ohio. The second speaker on the program was Mr. Charles A. Hubbel of the Porter-Cable Machine Company, Syracuse, New York. He discussed "Wet Belt Grinding." This meeting marked the third anniversary of the Los Angeles Chapter and the attendance consisted of 250 members and their guests.

#### (Moline) Tri-City

The Tri-City Chapter commenced its 1942-1943 season with a dinner meeting held at the Blackhawk Hotel. Mr. Fred Siebenman, chairman of the program committee introduced Mr. Carroll Edgar, cemented carbide engineer of the Vascoloy-Ramet Corporation as speaker of the evening. Mr. Edgar's subject was, "Cemented Carbide Tool Technique," in which he discussed the applications, practical uses, and proper design of carbide tools. An additional feature of the program was a movie and demonstration by the Weatherhead Company of Cleveland, Ohio, depicting the design and advantages of their high pressure Ermeto pipe fittings. These fittings

American Society of Tool Engineers, who gave a coffee talk entitled "Induction Hardening", which was preceded by the showing for the first time of a movie on this subject sponsored by the Van Norman Machine Tool Company. Later, Mr. Curtis spoke on the subject of "Tool Engineering" which was illustrated by slides.

#### Northern New Jersey

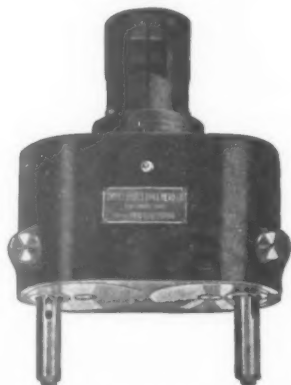
The Northern New Jersey Chapter opened its fall season with a symposium on "Women in Industry" on the night of September 8th. The three speakers participating were Bartley Whiteside, Production Superintendent of the Wright Aeronautical Corp.; Eugene C. Reed, Assistant Vice President of Thomas A. Edison, Inc.; and Herbert D. Hall, President of the Herbert Hall Co.

Thomas Mason, director of the Pater-son Vocational School, also showed some colored slides illustrating how women are put through a training course in his school before being inducted into local plants.

At this meeting was inaugurated a consultation service on problems relating to the manufacture of war products. It is felt that this service will prove very valuable as members learn to take advantage of it.



# U S HEADS STANDARD SINCE 1915

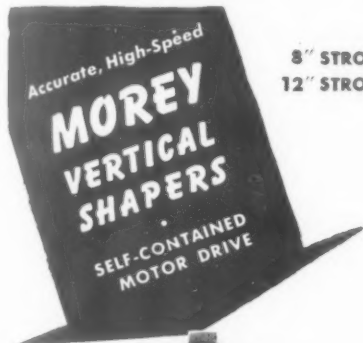


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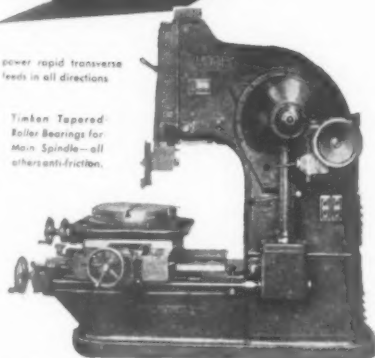
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power rapid transverse  
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Timken Tapered  
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Main Spindle—all  
others anti-friction.



Built to highest accuracy standards the MOREY  
VERTICAL SHAPER is simple for tool-room manu-  
facturing. Power feeds and power rapid trans-  
verse feeds in all directions are instantly available  
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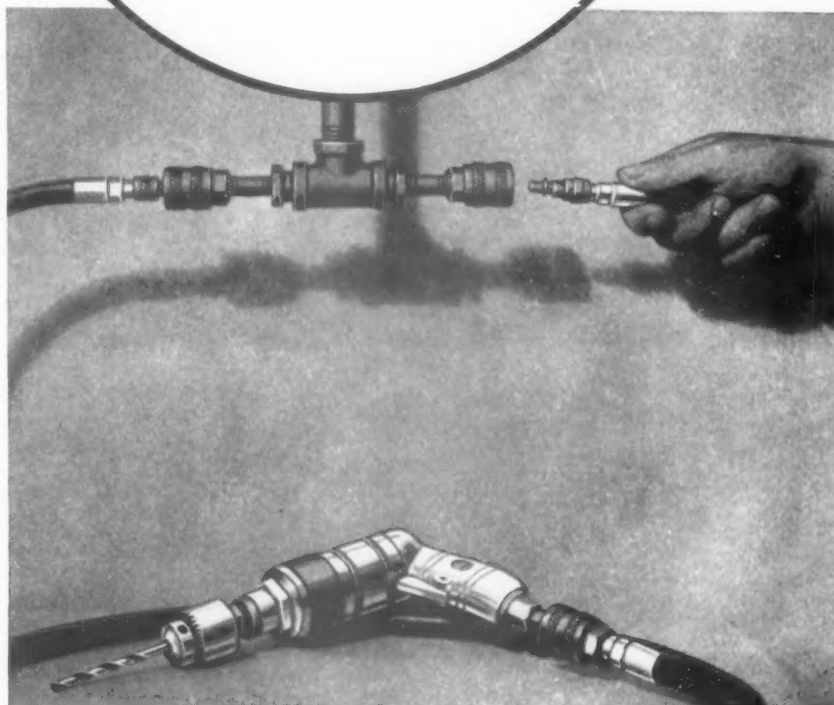
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# TIME...

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Aro Automatic Speed-Couplers provide greater safety, convenience and speed in the use of pneumatic tools of all kinds.

When an Aro Automatic Speed-Coupler is used, attaching an air hose to any pneumatically-operated device is merely a matter of "push on". It swivels, eliminating kinking and twisting of hose, thus prolonging its life. It's leak-proof.

To detach, merely "pull off" . . . the Shut-Off Valve closes automatically, making it unnecessary to close valve in air line. Cannot be accidentally detached.

Aro Automatic Speed-Couplers are in wide use in many plants for air and fluid connections to save today's precious time . . . to lessen operator effort . . . save hose . . . and to prevent air wastage. Write ARO for full details . . . or see your local jobber.

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**St. Louis**

The annual picnic of the St. Louis Chapter was held at Tamme's Grove the last of July with Wm. H. Scheer as entertainment chairman. Prizes donated consisted of everything imaginable. Defense Stamps predominated, contributions of which totaled some \$700.00. The committee was comprised of the standing committee chairman with others appointed to complete preliminary arrangements, and held meetings each week during the ten weeks preceding the picnic date. Besides the dinner and refreshments, members and

guests took part in soft ball, foot ball, horse shoes, swimming and darts, plus bridge, poker and other card games.

The St. Louis A.S.T.E. Clown Band was on the job again, doing their share to make the party complete. Ernest Clark, in charge of attendance prizes, got his committee under way with the drawing about 2:00 P.M. and for over three hours there was a steady line passing the window, everyone in attendance receiving a prize of some type.

**San Diego**

The San Diego Chapter held its August 28th meeting at the El Cortez Hotel.

At the business session of this meeting Mr. Charles Lord was elected as first vice chairman. Mr. J. A. Stroble was elected as second vice chairman, in the place of Mr. A. Nordstrom, recently resigned.

Mr. Ralph Oversmith introduced the speaker of the evening, Mr. J. M. Gwinn, Jr., director of the Tooling and Methods Department of Consolidated Aircraft Corporation. Mr. Gwinn's subject was production tooling in aircraft and the advancements that are being made by other companies, as well as Consolidated, toward this end. After Mr. Gwinn's talk, a 45 minute picture was shown entitled "Power by Wright".

**South Bend**

The South Bend Chapter opened its autumn series of monthly meetings on Tuesday, September 8th, at the Indiana Club. Mr. N. M. Voorhies, district welding specialist of General Electric Company, gave a talk on Arc Welding. Mr. J. A. Spencer, also of General Electric Company, showed a series of six films in full color and sound, each film covered a complete phase of welding.

**Williamsport**

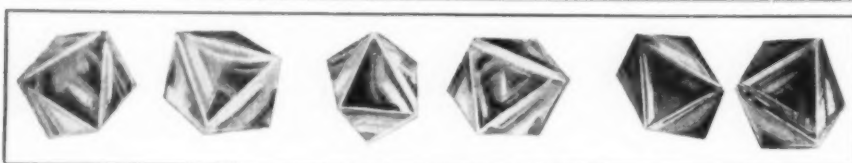
The Haleeka club house on Lycoming Creek was the scene of the summer picnic of the Williamsport Chapter on the afternoon of August 22nd. Members and guests took part in swimming, base ball, card games and the picnic refreshments.

CHIPS FROM A. S. T. E.  
NATIONAL HEADQUARTERS



**Boulevard Temple Building  
A.S.T.E National Headquarters**

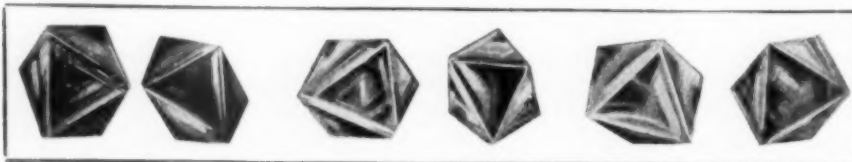
We welcome Windsor (Ontario) Chapter to the rapidly-growing list. They had a fine Charter night party at the Prince Edward Hotel Tuesday.  
(Continued on page 198)



These rugged diamond tools stand up under war time production. Carefully selected stones plus a firm nickel alloy setting insure full value and satisfactory truing performance on all grinding wheels. Both standard tools and special thread grinding diamonds carried in quantities for quick shipment. Write for information and circulars.

**F. F. GILMORE & CO.**

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Smooth as a Mirror and Perfectly Flat...



### It's an "Acme Lapped" Molding Die Insert!

★ The above actual photo illustrates the flatness of the surface of a steel molding die insert after it has been lapped by Acme. See how the image is reflected—not a single flaw.

Where molded parts must have a super-fine finish or a perfectly flat face, your most economical, safe answer is an Acme Lapped insert. In fact, there are many instances... widely different in scope... where Acme Flat Lapping offers the quickest and best solution.

For contract flat lappings send us your requirements—no obligation!



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Makers of Standardized Jig and Fixture Bushings

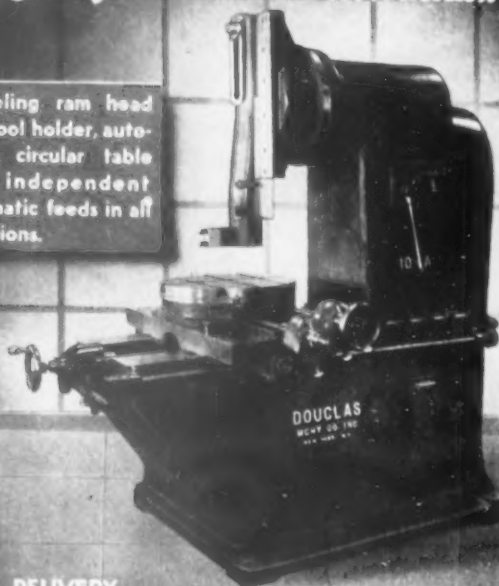
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## Douglas 10" STROKE SLOTTER for Precision

Swiveling ram head and tool holder, automatic circular table and independent automatic feeds in all directions.



EARLY DELIVERY  
by Large Stock Production

**DOUGLAS MACHINERY CO. INC.**  
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### HIGH SPEED TAPS

NOW ON CRITICAL LIST.  
KEEP THOSE NOW IN SERVICE 100% EFFICIENT BY PROPER SHARPENING.



THIS NO. 12 GRAND RAPIDS  
TAP GRINDER MAKES THE  
JOB A SIMPLE ONE.

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GRAND RAPIDS MICHIGAN



## Are Your Plug Gages Accurate AFTER LONG USE?

Make  
Doubly  
Sure  
WITH

**DUBLIFE**



ORIGINATORS and Exclusive mfrs. of DUBLIFE GAGES and UPCO FINISH

Plug Gages that last twice as long!

DUBLIFE PLUGS are reversible.

When one end of "Go" or "No-Go" Plug is worn from wear, change is quickly made by reversing worn plug. Bronze tapered collet in hexagonal handle, securely locks plug as driven in. Reversal means twice the service! Always specify UPCO finished for longest life.

Send for Complete Catalog of DUBLIFE and other Gages of American Gage Design. Specify DUBLIFE Gages and UPCO finish. Write.



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September 8th. They had more than 150 at the dinner. National Treasurer Frank Crone offered a toast "To the King," with a response "To the President of the United States," by David Barnett, First Vice-Chairman of the Windsor Chapter. The officers received the oath of performance and the Charter from National Secretary Clyde Hause. The inimitable E. C. Brandt, Chief of Machinery Division, Automotive Branch, War Production Board, Detroit District, made the speech of the evening. Sixty-two members were added to our rolls, with many new applica-

tions on the way. The new officers and addresses are as follows:

*Chairman*, Alan J. Norman (Elected A.S.T.E. 1/30/40), R.R. No. 1, River Canard, Ontario, Canada, *Company Affiliation*, Ford Motor Co., of Canada, Ltd., *Foreman, Tool Stores*; *First Vice-Chairman*, David Barnett, 1532 Dougall Ave., Windsor, Ontario, Canada, *Border Cities Industries Div., G.M.C., General Superintendent*; *Second Vice-Chairman*, William Gibson, 430 Giles Blvd., West, Windsor, Ontario, Canada, *Chrysler Corp. of Canada, Ltd., Plant Engineer and Master Mechanic* (Plant No. 2);

*Secretary*, D. M. Duncan (Elected A.S.T.E. 9/30/40), 249 Brady Blvd., Riverside, Ontario, Canada, *F. F. Barber Machinery Co., Ltd., Branch Manager*; and *Treasurer*, George W. Staples, 1411 Kildare Road, Walkerville, Ontario, Canada, *Ford Motor Co., of Canada, Ltd., Foreman, Products Dept.*



**HOWARD HANDYSIDE**  
A. S. T. E. Office Manager

This is Howard Handyside, the ever-pleasant and co-operative Office Manager at National Headquarters. He sees most of your letters and maybe you don't think it keeps him busy! He has quite a harem to whom we plan to introduce you through this column. When you are in Detroit, don't fail to drop in at 2567 West Grand Boulevard. Howard and all the rest of us will be glad to see you.

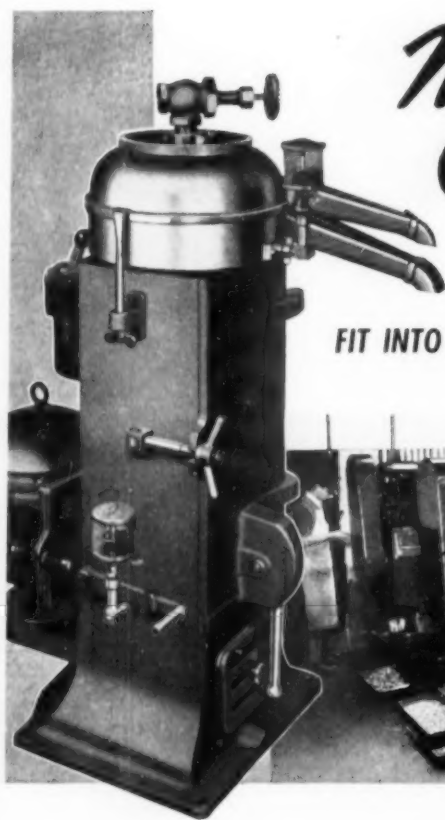
\* \* \*

Yes Sir, a toast to the boys down Kentucky way—they really came through with flying colors! The officers and committee men of Louisville Chapter can forget about collecting dues for the balance of 1942, as they no longer have any record sheets with ye old time red ink on the debit side.

The first Chapter to be entirely paid up in 1942, this group deserves very special congratulations, especially in view of the fact that it is one of the youngest A.S.T.E. Chapters, receiving its Charter on March 24th, 1942. No, it does not mean that they had an easier job of collecting dues—Louisville Chapter is in the Southern Area, which is made up of five Chapters, and Louisville is No. 2 on the list as having the largest number of members per Chapter in that area.

More power to you men of Louisville.  
(Continued on page 200)

**THE TOOL ENGINEER**



## National Acme CENTRIFUGE SAVINGS

**FIT INTO YOUR WAR PRODUCTION PICTURE, TOO!**



Centrifuge savings are applied to small shops like this and to hundreds of machines of all kinds employing thousands of gallons of coolants.

Machines take their worst beating when allowed to run with coolants and lubricants containing accumulated grit and other contamination. Merely separating chips and returning the coolant plus make-up is both unsafe and costly.

Clarification with a National Acme precision built centrifuge removes all the finely divided gritty materials, and tangible savings in any shop are these —

**You grind and replace cutting tools less frequently.**

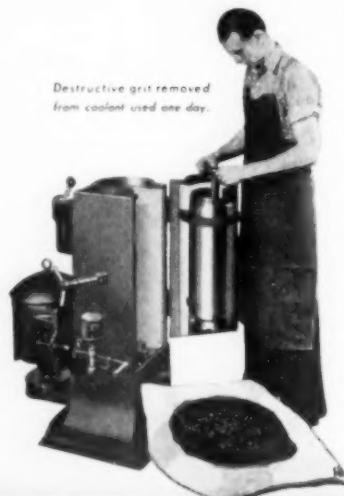
**A higher percentage of your product passes inspection.**

**Machine bearings and other operating parts show much slower deterioration.**

**You materially reduce both the quantities and costs of coolants and lubricants.**

Our centrifuge engineers will freely show you the application best suited to your shop. Complete Catalog, P-41.

Destructive grit removed from coolant used one day.



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# M-B "UTILITY" Pneumatic GRINDER

STEEL HOUSING - FOR SAFETY

MODEL  
U-TR  
A 60,000  
R.P.M. Unit

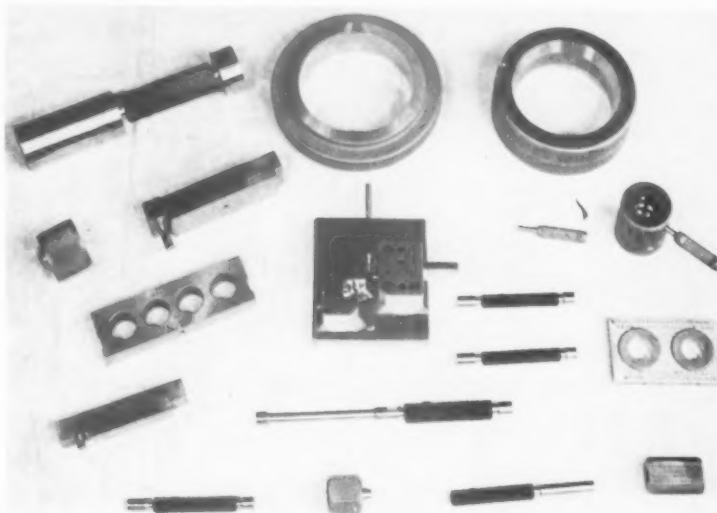
THESE are critical days . . . Victory hinges on production speed! That's why every plant needs several of these fast-cutting, sturdy tools as time and labor saving aids. The M-B "Utility" Pneumatic Grinder is precision-made, streamlined, excellently balanced. Grease-sealed bearings need no lubrication. Widely used and recommended . . . A highly useful companion to our famous "SUPER SPEED" Model SS-SR Pneumatic Grinder. Also Other Models, and Air Line Filters and Automatic Air Line Lubricators.

**WAR  
EFFORT  
DEMANDS  
THIS  
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POWERFUL  
TOOL**

Write for Circular and Details of FREE TRIAL OFFER

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## Precision Gages by Master Craftsmen



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Straight Side, Serration, Involute Male and Female Splined Gages, Plug, Ring, Snap, Flush Pin, Profile, Fixture, Length, Width, Thickness and Relation Gages. We have a complete Spline Engineering Service for your convenience. Gages with close tolerances are normalized and stabilized. All gages are inspected at 68° Fahrenheit. May we quote on your requirements.

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## DANLY Precision DOWEL PINS

All Die Makers'  
Supplies

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Dowel Pins

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Special Sets

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## DANLY PRECISION DIE SETS

OCTOBER, 1942

## Welds all sides down-hand with only one set-up



Place the weldment, regardless of size or shape, on a C-F Positioner. "Tack" it to the table and the welder can finish the job **alone**—can weld all sides down-hand without further crane work or jacking-up. With a C-F Positioner the welder himself rotates, twists and turns the heaviest and most cumbersome weldments with a push button control—can lay every fillet down-hand, assuring stronger, smoother, flawless welds "all over" easily and quickly.

Only the universal, multi-purpose C-F Positioners, both portable and stationary, are pedestal-mounted. The entire positioner can be rotated on its base to give maximum floor clearance or convenience and is adjustable for height. Table rotates full 360° and tilts to 135° from horizontal. Hand or power operated from 1200 lb. capacity up.

Write for new bulletin WP 22.



**CULLEN-FRIESTEDT CO.,**  
1218 S. KILBOURN AVE. CHICAGO, ILLINOIS

You have shown the rest of the Chapters that it can be done, and set a high mark for them to shoot at.

\* \* \*

National Secretary Clyde L. Hause has notified the following of their election as Regional Directors and has summoned them to meet in Springfield on Thursday, October 15th, with the other 10 Directors and the National Officers:

Region No. 3, Fred J. Dawless (Southern Conn. Chapter), 131 Park St., New Haven, Conn.; Region No. 6, Paul

Frankfurter, Sr. (Philadelphia Chapter), 4623 Morris St., Gtn., Philadelphia, Penna.; Region No. 10, W. J. Frederick (Cincinnati Chapter), c/o The Frederick Steel Co., 4758 Spring Grove Avenue, Cincinnati, Ohio; Region No. 12, Horace Wentzell (South Bend Chapter), 1702 W. Washington St., South Bend, Indiana; Region No. 13, E. W. Dickett (Rockford Chapter), 625 N. Court St., Rockford, Illinois; Region No. 16, H. T. Sprott (Nashville Chapter), 932 Silveroene Place, Nashville, Tennessee; Region No. 17, L. M. Cole (Houston Chapter), 409 Velasco

St., Houston, Texas; Region No. 18, William Asmus (San Diego Chapter), 2905 Bancroft St., San Diego, California; Region No. 19, Walter Kasselohm (Golden Gate Chapter), 1325 Ordway St., Berkeley, California; and Region No. 20, L. G. Singer (Toronto Chapter), 11 Front St., East., Toronto, Canada.

\* \* \*

Elmira (New York) Chapter had Executive Secretary Potter as a speaker on Monday, the 14th. The gang asked lots of questions and had many answers. They had a nice meeting with a good attendance.

\* \* \*

More than 60 attended the Charter Meeting of the Bridgeport group. Frank W. Curtis was the coffee talker and showed his "Induction Hardening" film. He sure knew his stuff and answered many questions. H. E. Linsley, of Wright Aeronautical, did a fine job pinch-hitting for Bill Brown who was expected, but prevented from attending by the terrific pressure of his work in New Jersey. Linsley, already known to many from several Chapter appearances and his talk at the St. Louis Convention, did a masterful job and left the gang with the feeling that Tool Engineers are and will continue to be of tremendous importance in the economic development of our Nation. Director-Elect Fred J. Dawless brought up the whole Executive Committee from New Haven and administered the oath of office to those who will guide the destinies of Bridgeport Chapter. They are:

*Chairman*, Thomas J. Fish, President, Ready Tool Company, Bridgeport, Conn.; *First Vice-Chairman*, Oscar W. Cooper, Yale & Towne Mfg. Company, Stamford, Conn.; *Second Vice-Chairman*, A. S. Curry, Nash Engineering Company, South Norwalk, Conn.; *Secretary*, Ernest Reaney, Sr., O. K. Tool Co., Inc., Shelton, Conn.; *Assistant Secretary*, Chester Orciuch, Automatic Machinery Manufacturing Company, Bridgeport, Conn.; and *Treasurer*, William Brown, Andrews Industries, Stamford, Conn.

Watch Bridgeport grow. They are having no meeting in October so they may all attend the WAR PRODUCTION CONFERENCE at Springfield.

\* \* \*

The work of a Tool Engineer these days is truly heroic in itself, but once in a while one of our members distinguishes himself in a public way. Most recently this honor fell on the shoulders of John W. Parker, President of the Majestic Tool Company, Detroit. Sunday, August 23rd, he helped to

(Continued on page 202)

## DRILLS AND TAPS 65 ENGINE BLOCKS AN HOUR!



★Write for complete information on this Bradford drilling and tapping machine.

Illustrated is a five-unit Bradford machine for performing various drilling and tapping operations on a cylinder block. The cylinder and the synchronization of the machine are controlled by electrical devices through a control panel mounted in the vertical column. Operator's work limited to just loading and unloading. A pilot light notifies the operator when the machining cycle is completed. Net Production: 65 per hour. Write today for complete information.

ALSO MANUFACTURERS OF METALMASTER 12", 14", 16" LATHES

**THE BRADFORD MACHINE TOOL CO.**  
CINCINNATI, OHIO  
PRECISION TOOLS SINCE 1840



**BUY  
WAR  
BONDS  
TILL IT  
HURTS  
(THE AXIS)**



Space By Courtesy Of  
**M. E. CUNNINGHAM CO.**  
MARKING DEVICES  
169 E. Carson St. Pittsburgh, Pa.



**DIE-LESS  
DUPLICATING**

A great variety of simple or intricate forms and shapes can be quickly duplicated to a tolerance of .001" with DI-ACRO Precision Machines—Shears, Brakes, Benders. For experimental and research work or production runs, DI-ACRO Units form angle, channel, tube, rod, moulding, wire, strip stock; shear stock sheets, trim duplicated stampings. With DIE-LESS DUPLICATING, die expense and time delay are frequently saved.

Send for 32-page Catalog — "Metal Duplicating Without Dies".



**O'NEIL-IRWIN MFG. CO.**  
307 - 8th Ave. S., Minneapolis, Minn.

**"PRECISE" 35  
GRINDER AND MILLER**

*Electric!*

**35,000 LOAD RPM**

**35 OUNCES**

**1/7 H.P. FREE AT SPINDLE**

*Speed Counts*



GRINDING

On all materials with mounted wheels from 1/16" to 1" diameter x 1/2" face.

MILLING

In nonferrous material with "PRECISE" Cutters up to 3/8" diameter x 1" face.

Now available in AC/DC 110 or 220 Volt. Direct Drive. 100% Shockproof. No Vibration. Capacity 8 hours continuous run. No undue heating. Hand or Machine-mounted Operation.

**PAUL F. HERMANN COMPANY**  
3400 FORBES ST. PITTSBURGH, PA.

**PRECISION THREAD MILLER  
FULL AUTOMATIC CONTROL**



INTERNAL OR EXTERNAL RIGHT OR LEFT — UP TO 7 INCH DIAMETERS  
COMPLETE MOTOR EQUIPMENT — FIXTURE TO SUIT

*The James* **COULTER** *Machine Co.*  
BRIDGEPORT • CONNECTICUT • U. S. A.

rescue ten persons, including three children, from a sinking cruiser 10 miles from shore on Lake St. Clair. Orchids to John Parker!

President Otto Winter reports attendance at a splendid meeting of the Chicago Chapter, Monday, the 14th.

\* \* \*

If you haven't seen a copy of the "Syracuse A.S.T.E. News," you've missed a lot. Boy, it's hot! Walter Winchell has nothing on their reporter. It's not copyrighted, so here is a quote:

"Hank Young is trying on his shoes,

so it must be Fall. Coming to the City soon, Hank?" According to reports, the boys like it.

\* \* \*

Out of 3866 ballots mailed to members so that they could vote for Regional Directors, only 1024 were returned. Only 26.5% apparently care who is a Director. Sometimes we wonder if we should put postage stamps on the return envelopes!

\* \* \*

The National Executive Committee met at Springfield, Massachusetts, Sun-

day, the 13th, with representatives of the Chapters in the Northeast. It was a fine meeting and President Winter expressed himself as wholly confident that the WAR PRODUCTION CONFERENCE in Springfield, October 16-17, will be one of the best Semi-Annual Meetings yet held, and that the program is one which no Tool Engineer can afford to miss (see the complete program elsewhere in this issue).

\* \* \*

You remember those reply cards we sent to you? Many have not yet been returned BUT already we have recorded more than 800 changes of address and employment. Many of our members are "going up the ladder." A change of address involves a great deal of work and changes in many records. We want those notices, though, so our records will be correct. Rush them to us PLEASE.

\* \* \*

Toronto had quite a meeting September 11th. Past President Frank W. Curtis gave a talk and showed his new film on Induction Hardening. The Executive Secretary arrived by a four-hour late plane just as the meeting was closing and found the meeting place changed from the Oak Room at the Union Station (the Chapter had been forced to vacate so that a bunch of Axis prisoners could be fed) to the Royal York Hotel. Attendance was within two of beating their best.

\* \* \*

—HANDY ANDY SAYS—

(Continued from page 190)

OH WELL, we'll probably discuss ways of producing better and faster at the Semi-Annual when we meet in Springfield, the Convention being but a few days off when you read this.

Attend if you can possibly get off, for the time away from the job will be more than compensated for by stimulus of new ideas. Tell the Old Man that, and get him to come along, too — he'll see his own problems the clearer for knowing how the other fellow works.

And believe me, there's plenty of that Yankee ingenuity around Springfield, just as important in this scheme of war production as the colossal assembly lines of the middle west. All aboard, now!—on to Springfield!

Handily Yours,



THE TOOL ENGINEER

## "PUT IT ON THE BLANCHARD"



For speed, accuracy, and low cost on your larger surfaces you should investigate the Blanchard No. 27.

## Grind Large Work FROM THE ROUGH

This Blanchard No. 27 Surface Grinder, with 42" segment wheel and 84" swing, grinds steel and semi-steel die shoes from the rough. The work varies in size but each chuck load, whether one large piece or several small pieces, presents a large area from which 1/8" to 1/4" stock must be removed. Because of the competitive nature of the product (standardized die sets) every effort must be made to keep costs low. Loading time is shortened by using a lifting magnet, and the grinding is done at the fastest possible rate. The machine is kept continuously busy and, in addition to die shoes, it machines many large steel plates.

**The BLANCHARD**  
MACHINE COMPANY  
64 STATE STREET, CAMBRIDGE, MASS.



Send for your free copy of "Work Done on the Blanchard." This book shows over 100 actual jobs where the Blanchard Principle is earning profits for Blanchard owners.

## CHECK THESE ADVANTAGES OF BLANCHARD GRINDING

- ★ Production
- ★ Adaptability
- ★ Fixture Saving
- ★ Operation Saving
- ★ Material Saving
- ★ Fine Finish
- ★ Flatness
- ★ Close Limits

Especially valuable on jobs like the one illustrated.

Performance of the  
finished work—

What else is more im-  
portant to you?



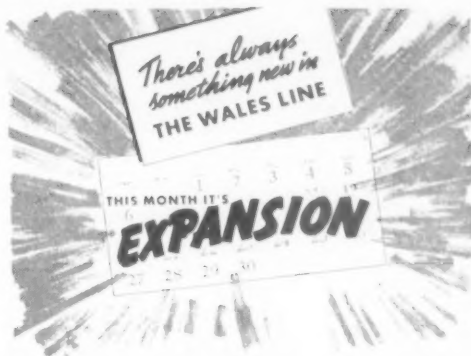
**NATIONAL TOOL SALVAGE CO.**  
3816 Beaubien St.,  
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- **MACHINE  
DEVELOPMENT**
- **MACHINE  
DESIGN & BUILD**
- **TOOL DESIGN**

Quotations promptly  
furnished — **WIRE** or  
**WRITE** Today.

**PROVEN  
DEPENDABLE  
SERVICE**

**McGOWAN**  
**ENGINEERING-SERVICE**  
★ 486 PAWTUCKET AVE. ★  
PAWTUCKET - RHODE ISLAND



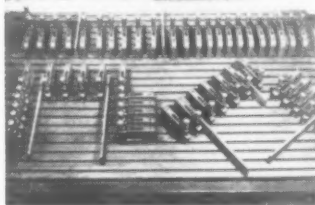
**A NEW PLANT . . . A  
NEW ADDRESS . . . NEW  
QUICKER DELIVERIES  
. . . MORE NEW WALES  
PRODUCTS**

**CERTAINLY** — moving into a new, larger plant provides increased production and faster deliveries of Wales Punching and Notching Units to today's essential metal fabricating industries.

**AND** — when Victory comes, The Strippit Corporation will be ready with new ideas . . . new short cuts . . . new economies . . . new techniques . . . and **NEW WALES PRODUCTS** for your competitive peace-time conditions.

**REMEMBER** — There's Always Something New in the Wales Line.  
Keep posted by writing to —

Showing 3 set-ups of Wales Units  
one T-slotted plate.



## THE STRIPPIT CORPORATION

345 Payne Avenue  
North Tonawanda, N. Y.\*

GEORGE F. WALES, President  
Specialists in Punching and Notching Equipment

\*North Tonawanda is 10 Miles North of Buffalo, between  
Buffalo and Niagara Falls

## Ransome. Welding Positioners for Greater Production



Left. Many-angled piece positioned for all downhand welds.

Center. Heavy machine bases are of welded construction.

Right. A complicated weldment easily handled on a positioner.

Booth B-102 • National Metal Show • Cleveland • Oct. 12 thru 16



CAPACITIES FROM 2500 LB. HAND-OPERATED TO 20 TON MOTOR OPERATED

INDUSTRIAL  
DIVISION

**RANSOME MACHINERY CO.**

DUNELLEN  
NEW JERSEY



# Faster Inspection

...less fatigue  
WITH THE  
**NEW MICRO-CHEK**



Multiplies dimensions by as much as 200; enables accurate visual gaging to within .0001 inch. Adjustable anvil attachment, complete, ready for use (range: split 1000ths to 2").

Trico's years of experience in the production of precision parts lie behind the development of this new Precision Inspection Instrument.

Its advantages over conventional gaging methods are: 1. Greater speed with no sacrifice of accuracy; 2. Faster reading, less eyestrain and fatigue on operators; 3. Original accuracy continuously retained by re-setting with original master parts; 4. Inexperienced workers quickly become accurate inspectors; 5. Fixtures or anvils for holding parts to be inspected require less accuracy and cost less to make.

★ Send for your free copy of booklet showing many applications of MICRO-CHEK in use.

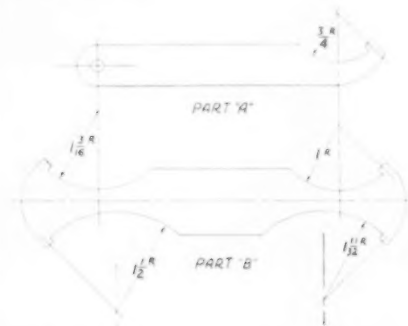


**TRICO MICRO-CHEK**  
TRICO PRODUCTS CORP.  
783 Washington Street, Buffalo, N. Y.



## Stamped Spanner Wrenches

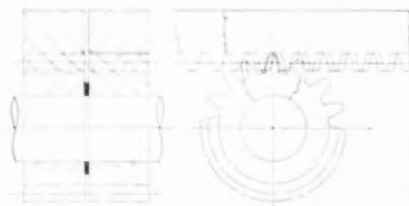
To save labor and material where four sizes of spanner wrenches are required — "A" is typical of a single wrench — four wrenches have been embodied in one piece of material such as is shown by "B".



After careful consideration, it was decided to construct a die of initial low cost, short set-up time, and high quality production to produce a limited number (500 in this case) of "B" type wrenches. While the die in this case was of initial low cost, the semi-mass production ability compared very favorably with that of the conventional type die used in blanking and piercing such parts. This was not only a great saver in material and labor on tool cost in producing the various wrenches, but was a very decided factor when finishing, heat treating, plating and packing for shipment.

## To Obtain Finer Mesh Between Pinions and Racks

Where comparatively small pinions mesh with racks, or even with larger



gears, a better and smoother tooth contact is obtained by staggering pairs, as (Continued on page 206)



## LIFE for Workers and Machinery when you install— **TORIT** DUST COLLECTORS

Abrasive dust and grit permitted to circulate at large, wherever men and machines are at work, will cause untold damage both to machines and to health of employees.

TORIT Self-contained DUST COLLECTORS attached to grinding, buffing and cut-off machines will efficiently and economically trap this dust hazard. TORITS are portable—may be placed wherever needed.

Write for bulletin giving the TORIT features, specifications, and prices. We will gladly help you solve your dust control problem.

**TORIT**  
MANUFACTURING CO.  
281 Walnut Street  
St. Paul, Minnesota



Traps dust from grinding and buffing wheels instantly!

**TORIT**  
**Dust Collectors**  
SELF-CONTAINED UNITS

## CERRO ALLOYS for Prompt Shipment

**CERROMATRIX** (Melting Temp., 250° F.) for securing punch and die parts, anchoring machine parts without expensive drive fits, for engraving machine models, stripper plates, chucks, short run forming dies and other metal-working applications.

**CERROBEND** (Melting Temp., 158° F.) Used as a filler in bending thin-walled tubing to small radii. Easily removed in boiling water. Also used for aircraft assembly jigs, templates for forming dies and other purposes.

These two low-temperature-melting and expanding alloys are helping to speed up production of war materials for the Army, Navy and Air Force.

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## CERRO DE PASCO COPPER CORPORATION

40 WALL STREET

NEW YORK, N. Y.



Characteristic of the design of all STURDIMATIC LIVE CENTERS is a low overhang and a slight cushioning action.

that compensates for expansion due to heat, shock and excessive thrust loads—reducing wear to a minimum. A properly engineered live center is one of the fundamentals of setting up a job and requires a specialist's experience.

... standard shanks with Morse taper carried in stock.

We will see that your job is set up with the right LIVE CENTER—prompt deliveries on high priorities.

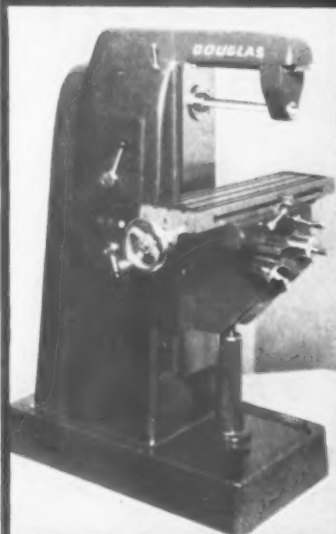
**STURDIMATIC  
 TOOL COMPANY**  
 5218 THIRD AVE. DETROIT, MICH.

OCTOBER, 1942

## DOUGLAS

### PLAIN MILLER

### FOR SMALL PARTS PRODUCTION



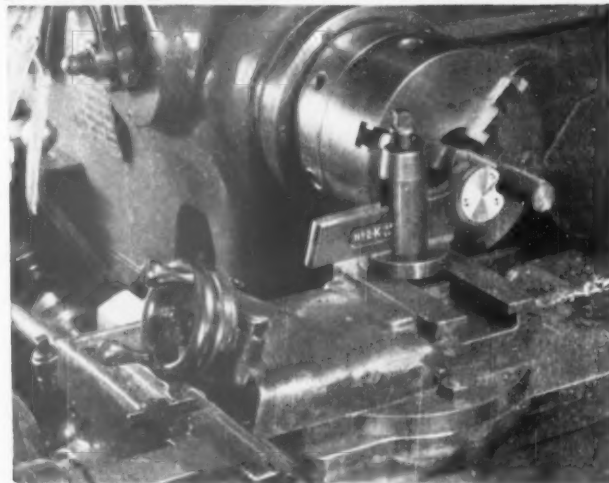
WIDE RANGE OF  
 SPINDLE SPEEDS from  
 75 to 1200 R.P.M.

TABLE SIZE  
 32" x 8"

QUICK DELIVERY  
 BY LARGE SCALE PRODUCTION

**DOUGLAS MACHINERY CO. INC.**  
 150 BROADWAY NEW YORK, N. Y.

## ARMSTRONG



### Uniform clean-cut knurling always

- Your knurling can be no better than your knurls and the tool that holds them. Standardize on ARMSTRONG Hobcut Knurls—the sharper deep cut, accurately formed patterns. Use them in the ARMSTRONG Knurling Tool which is automatically self-centering, which automatically equalizes pressure on knurls and "tracks" accurately. Knurls are held in a large knuckle joint that has strength to withstand tremendous side and end thrust. Write for Catalog C-39.

### ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

360 N. Francisco Avenue Chicago, U.S.A.  
 Eastern Warehouse & Sales: 199 Lafayette St., New York

# 7 TIMES AS FAST WITH **DoAll BAND FILES**



Filing sheet steel parts for instrument cabinets and panels now speeded through with DoAll Band Files. Formerly done on nibbler and hand filed.

## CONTINUOUS ONE-WAY STROKE

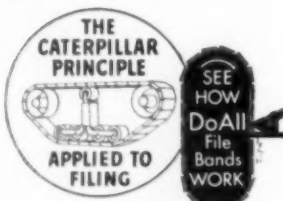
There's no stopping or back-stroking. Filing with a DoAll means steady, one-direction travel, with even pressure until the job is perfect. This caterpillar principle means you are cutting at maximum all the time.

37  
FILES  
LIKE  
THIS  
ON A  
STEEL  
TAPE  
MAKE  
ONE  
DoAll  
FILE  
BAND

Then — there are tremendous savings in file costs. For example, on a recent test, a DoAll Band was run at the rate of 100 feet per minute filing Ketos steel held against the file by 25 pounds' pressure. The file band ran for 125 hours continuously before showing wear.

There's a wide range of styles, cuts and widths to take care of any kind of material.

Send for  
new File  
Booklet,  
prices  
and  
discounts.



## THE DOALL COMPANY

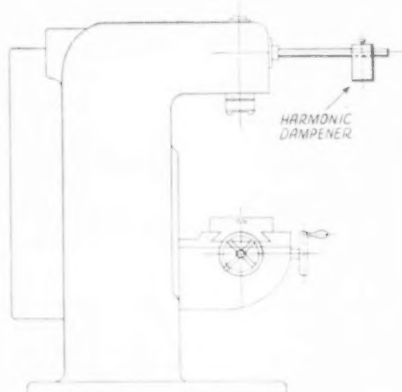
1211 Thacker St., DesPlaines, Ill.  
Associated with Continental Machines, Inc.,  
Minneapolis, Minn.

shown in the illustration. This also adds to the strength since more teeth are engaged at one time. The same idea is applicable to ratchet feeds, the staggering permitting finer feeds into comparatively coarse teeth.

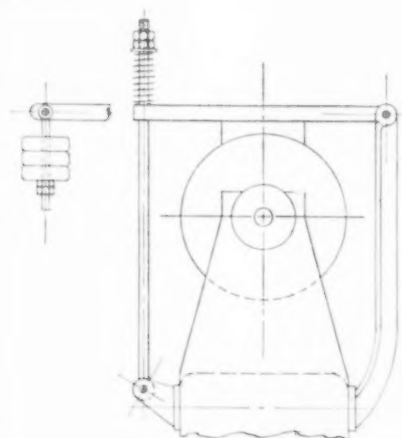
## Vibration Dampener

Since milling cutters will chatter under certain conditions, as with various metals or sections, or combinations of cutters, material and section, a "harmonic" vibration dampener has been devised which shows interesting possibilities in overcoming this.

A rod, (a) is attached to the miller head. A sliding weight (b), held by a thumb or set screw, is then adjusted to the point where it deadens the harmonics, throwing one of them sufficiently out of time to destroy the unison which causes vibration and chatter.



The vibration dampener shown above is not without precedent, similar devices being used to deaden vibration in automobile engines. Then too, we have the old-fashioned and reliable (but not always applicable) "brake" shown below for reducing chatter. The sketch is self-explanatory, showing both spring tension and weight as preferred. It should be adjusted to eliminate "springback" without putting too much load on the machine.



(Continued on page 208)

## **LUFKIN** INSIDE MICROMETER CALIPERS FOR BETTER "BALANCE AND FEEL"



For taking exact inside measurements Lufkin Inside Micrometers out-perform all others. Available in sets for taking accurate measurements from 1½" to 40".

Being of hollow steel tubing the measuring rods are light in weight, yet very rigid. The rods can be added to either or both ends of the micrometer head. The head can be kept in the center for better feel, easier adjustment and best reading position.

Rods are adjustable by means of a hardened and ground plug at one end to allow for wear.

For complete facts about these or any other Lufkin precision tools see your distributor. Write for catalog.

# **LUFKIN**

SAGINAW, MICHIGAN • New York City  
TAPES • RULES • PRECISION TOOLS

THE TOOL ENGINEER



## Eliminates Hand Lapping

### CASE HISTORY No. 6.

Lapping of intricate H.S.S. compression dies, with a Universal Slotmaster, requires a man's time only while setting up the job. . . . The operation is started by lowering the lapping arbor to the mouth of the die opening and then setting the downstroke of the slotter so that it will completely compress the spring, which is mounted between a shoulder on the shank of the lapping arbor and the tool holder. The spring then gradually relaxes and the lapping arbor works its way into the opening, as a result of spring pressure and the stroking of the slotter. When the spring is completely relaxed — the downstroke of the slotter is again set up to completely compress the spring and the operation is repeated until the full length of the opening in the die has been lapped.

Thumbnail illustrates set-up.

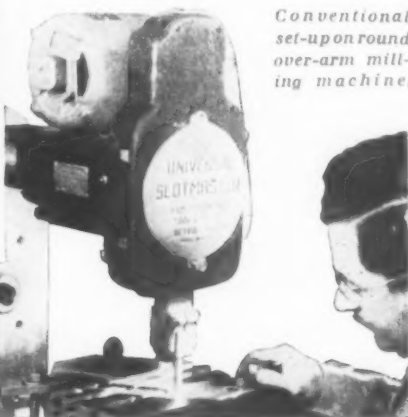


SLOTMASTER can be used on milling machines and provides double duty facilities at a minimum cost. It requires but little time to change-over from one head to the other. . . . The stroke of the ram is adjustable from 0 to 4" . . . the speeds range from 50 to 250 s.p.m. . . . The tool holder of the clapper box type, can be turned in any position. . . . All of the working parts are of tool steel heat treated and ground to close tolerances. . . . SLOTMASTER comes complete with pulleys, motor, belt, and mounting adaptable to round over-arm or flat-on round overarm milling machines.

Send for 4-page catalog and give the specifications of the milling machines that you wish to equip. Immediate deliveries on high priorities.

EXPERIMENTAL TOOL & DIE COMPANY  
12601 Greiner  
Detroit, Mich.

Conventional set-up on round over-arm milling machine.





**THIS BOOK**  
*Will Help*  
**Solve**  
**WARTIME**  
**STORAGE**  
**PROBLEMS**

★ Drawing on years of shelving, locker and cabinet designing experience, Lyon Engineers have developed a complete line of storage units in WOOD . . . including the famous Lyon Shoprobe.

Catalog No. 1705 on this Engineered Wood Line is now ready. Mail coupon for free copy.

#### LYON METAL PRODUCTS, INCORPORATED

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Branches and Distributors in All Principal Cities

#### LYON METAL PRODUCTS, INCORPORATED

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Send Catalog of Lyon Shelving, Shoprobe, Lockers and Cabinet Engineered in Wood for the Duration.

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**LYON METAL PRODUCTS, INCORPORATED**

OCTOBER, 1942

## Torque Wrench

**MORE** ACCURACY  
**LIFE**  
**SPEED**

3 DIALS

**NO** FRICTION  
ADJUSTMENTS  
MOVING PARTS  
FRAGILE MECHANISMS

Constructed for exacting laboratory work or continuous production use.

A practical wrench correctly engineered.

PERMANENT ACCURACY.

A capacity and size to fit your needs.

State capacity needed.

PIONEER MANUFACTURERS OF  
ACCURATE MEASURING WRENCHES

PA. STURTEVANT CO.  
ADDISON QUALITY ILLINOIS

## SPEEDS CONTOUR GRINDING IN PRODUCTION

Designed for intricate contour and profile grinding in Tool and Die work, Boyar-Schultz Profile Grinder No. 2 is now making a noteworthy contribution to the war effort in the production lines of plants making aircraft, guns, tanks and other heavy munitions.

Two spindles, each operation at the high speed of 10,000 R.P.M. make this Grinder a specially versatile machine tool; one that fits into efficient production as readily as it has in Tool and Die work.

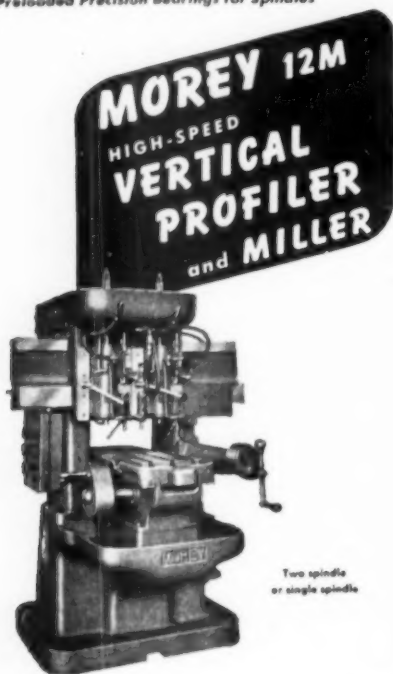
Let Us Send You Full Information

### BOYAR - SCHULTZ CORPORATION

2116-K WALNUT STREET

CHICAGO, ILLINOIS





Speed and more speed in the production of interchangeable parts requiring milling of any contour or outline is yours in the MOREY 12M. Provision for increased clearance between spindles and table.

Ask for Bulletin 680-A

**MOREY MACHINERY CO., INC.**  
410 Broome Street New York, N. Y.



## CONTROLLED FLOW

Gusher Pumps can be throttled to any extent without building up pressure. This and other **exclusive** features help you speed production.



Model 11020-A

One of the latest and most modern types of coolant pumps. Intake and discharge pass through flange directly into machine making a very neat and efficient installation.

Write for engineering data and specifications.

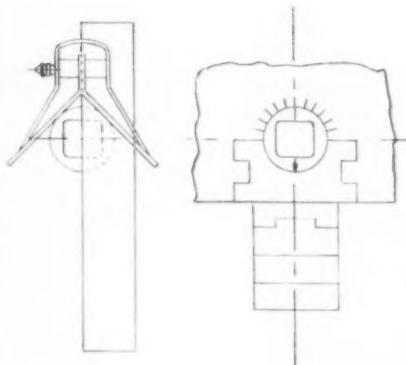
**THE RUTHMAN MACHINERY CO.**  
1815 READING ROAD, CINCINNATI, OHIO  
LARGEST EXCLUSIVE BUILDERS OF COOLANT PUMPS

## Graduations on Lathe Chuck Speed Accurate Chucking

The idea of a graduated chuck screw will appeal to anyone familiar with the difficulty of truing work in an independent jaw chuck. While the face of the chuck is usually graduated with concentric markings for "sight" gaging of jaws, these only serve for approximate setting.

If, however, graduations are marked on the screw head, as shown, it will be possible to duplicate previous settings. In effect, the graduations are comparable to micrometer setting.

In graduating the screws, proceed as follows: (1) Chuck a previously turned stub shaft and indicate to run dead true. (2) Make a small mark on screw and chuck in line of central graduation. (3) Step off balance of graduations with dividers, preferably about 1/4-inch apart as finer graduations are confusing. (4) Number the screws for replacement in their respective holes, and remove them from the chuck. (5) Draw a line across the head of the screw,



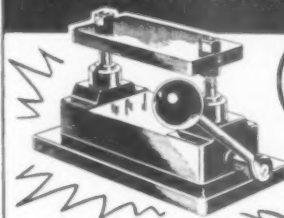
using a center head as shown. This line coincides with the small mark previously made and the end of the line, on the opposite side, is marked with an arrow head. Mark all screws in like manner and replace.

These graduations will now serve for any diameter of work up to capacity of chuck, tentatively setting jaws to concentric rings and using the graduated screws for fine adjustment.



**THE TOOL ENGINEER** will pay \$5.00 for your kinks or shop shortcuts published in this column. Brief, practical articles should be accompanied by sketches or photos.

## CUTS TOOLING TIME SPEEDS PRODUCTION



\$29.75

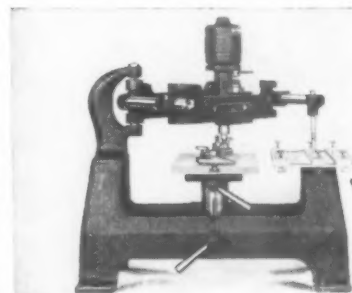
## THE UNIVERSAL VISE

Gives you a ready-designed drill jig body that greatly reduces the tooling time and helps you get into production faster. You'll be amazed at its loading and unloading speed. Positive, quick action lever locks work instantly — holds securely — throw it back and work is released. No complicated adjustments. No costly drill fixtures needed — just a comparatively inexpensive drill bushing plate and adaptor for each job. Sturdily constructed thruout — nothing to get out of order. Pays for itself many times over. Only \$29.75 f.o.b. Chicago.

**ORDER TODAY**  
Include contract number or priority certificate

**MOHR LINO-SAW COMPANY**  
122 N. Union Ave., Chicago

## For Precision Marking In War Production . . .



## ENGRAVER PANTO ACID ETCHER ELECTRIC MARKER . . . three machines in one

A compact precision bench-type pantographic machine, with interchangeable heads . . . for engraving instrument dials, name plates, etc. . . and for acid etching or electrically marking tools and parts—heat-treated or annealed—on flat, concave, or convex surfaces.

Illustration shows machine with engraving head attached.

» Write for Literature

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1610 SUMMIT ST. NEWARK, NEW JERSEY

THE TOOL ENGINEER

**DEPENDABLE**

**PYOTT**



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PULLEYS



GEARS



MULTIPLE  
V-BELT  
CAPACITY

Many Pyott customers of today placed their initial order with this organization over two generations ago. Here business relationships have endured for years — through war and peace — through good times and bad — because they have been founded upon the solid foundation of customer satisfaction.

Your Guarantee  
of Correct Engi-  
neering Design

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Also CAST IRON AND GRAY IRON CASTINGS

**"For High Achievement"**



IN RECEIVING the coveted Army-Navy "E" Production Award, we at Putnam Tool Company promise that we will continue to merit our present honor. The high quality of our end mills, counterbores, and reamers will be constantly maintained, and these cutting tools will be produced in ever-increasing quantities for the duration of the war.

**PUTNAM TOOL COMPANY**  
2987 Charlevoix Ave. • Detroit, Michigan

OCTOBER, 1942

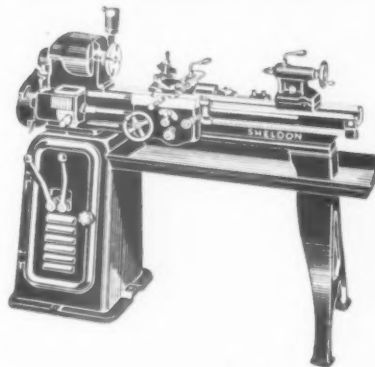
*Rotores* GRINDER  
FOR ALL TOOLS  
PROMPT DELIVERY  
BY LARGE SCALE PRODUCTION



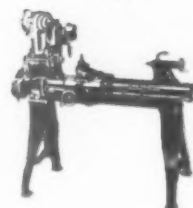
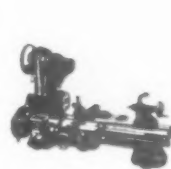
**DOUGLAS MACHINERY CO.**  
150 BROADWAY NEW YORK, N. Y.

**SHELDON** Back Geared Screw Cutting  
PRECISION LATHES

**For the Tool Room**



The finest 10", 11" and 12" lathes ever built in the moderate price field. Large special analysis steel spindles GROUND ALL OVER, with extra collet capacity. Hand-scraped Bronze, Ultra-Precision Ball or Super Precision Roller spindle bearings. (The finest bearings obtainable). Heavy braced, semi-steel beds with hand scraped ways (2 V-ways and 2 flat ways). These lathes come with a choice of aprons, gear boxes, and drives including the anti-friction, 4-speed, V-belt Lever-operated pedestal base motor drive. Illustrated. Telescopic Taper Attachment and other accessories available.



**For Production**

Sheldon Lathes will stand up to any production work within their capacity—are ideal for second operation work. Production models available with any or all of these features: Ultra-Precision Ball or Super-Precision Roller spindle bearings, Lever-operated Collet Attachment, Lever-operated Tail Stock, Lever-operated cross slide with double tool post, Lever-operated turret, etc.

**For Machine Shop**

Both Bench and floor models with choice of Semi-quick or Full-quick Change Gears, Plain Aprons or Worm Feed Apron with Power Cross Feed, Overhead, Back or Underneath Motor Drives—Telescopic Taper Attachments, Tool Post Grinders, Milling Attachments and all standard accessories.

Write for Catalog and name of nearest distributor.

**SHELDON MACHINE CO., INC.**

4252 N. KNOX AVE.

CHICAGO, U.S.A.

209



# THE PASSING PARADE . . . .

The Ever-Changing Scene in Mass Manufacturing

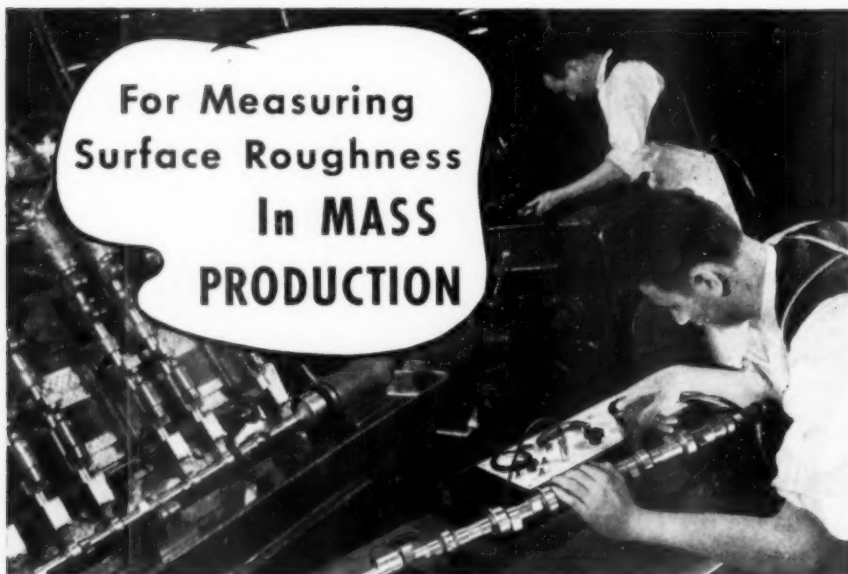
**LODGE & SHIPLEY MACHINE TOOL COMPANY**, Cincinnati, will "pass up" any formal celebration of the firm's golden jubilee it has been recently announced. Founded 50 years ago, this builder of lathes is too busy on war production work to have any public celebration of this milestone.

Founded in 1892 by William Lodge and Murray Shipley, Jr., this firm has grown from a hand-full of artisans and

machinists to approximately 1,100 employees today.

Shortly after Mr. Lodge's death in 1917, the holdings of the Shipley interests in the business were bought and the firm has been owned entirely by the Lodge family. William Lodge Dolle, grandson of the founder, serves as president and general manager.

(Continued on page 212)



**P**ROFILOMETERS\* continue to have ever-increasing value in mass production. They are instruments which give "Profilometer Readings" . . . accurate and direct measurements of surface roughness . . . the **exact** information required in checking specified finishes.

In production departments, Profilometers are especially valuable for checking set-ups at the time the first piece is made, thus eliminating scrap. They are also extremely practical for use in inspection departments during every working hour. Profilometers can be furnished either for constant three-shift operations on 115 volt 50-60 cycle power lines, or as self-contained instruments complete with batteries for full portability.

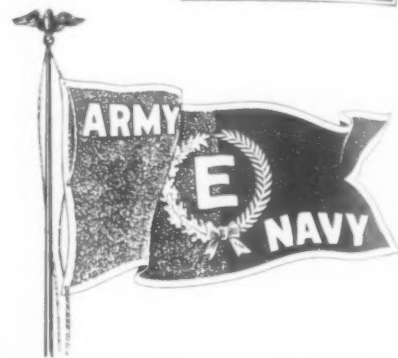
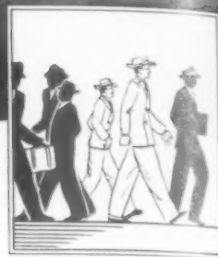
Profilometers can save time and money in your operations . . . help to speed production . . . and eliminate needless scrap. Write for full details.

\*Profilometer is the trade name registered in the U. S. Patent office by Physicists Research Company.

## The PROFILOMETER

**PHYSICISTS RESEARCH COMPANY**

343 SOUTH MAIN ST. • ANN ARBOR, MICH.



### ARMY-NAVY "E" AWARDS GIVEN RECENTLY

- ARMSTRONG BROTHERS TOOL COMPANY, Chicago.
- BUFFALO PUMPS, INC., North Tonawanda, N. Y.
- CARLTON MACHINE TOOL COMPANY, Cincinnati, O.
- CHEVROLET GEAR AND AXLE DIVISION, Detroit.
- GREENLEE BROS. & COMPANY, Rockford, Ill.
- HANDY & HARMAN, Fairfield, Connecticut.
- JENKINS BROS., Bridgeport, Connecticut.
- JONES & LAMSON MACHINE CO., Springfield, Vt.
- KEARNEY & TRECKER CORPORATION, West Allis, Wis.
- THE LANDIS TOOL COMPANY, Waynesboro, Pa.
- NATIONAL BROACH & MACHINE COMPANY, Detroit.
- NATIONAL AUTOMATIC TOOL COMPANY, INC., Richmond, Ind.
- O'CONNOR MACHINE COMPANY, Sheffield, Pennsylvania.
- PRATT & WHITNEY, Hartford, Connecticut.
- WILLIAM SELLERS & COMPANY, Philadelphia.
- SIMMONS MACHINE TOOL CORPORATION, Albany, N. Y.

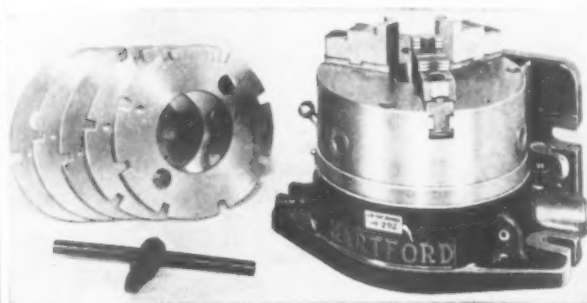
### RECENT TREASURY AWARDS BULLSEYE FLAG

SUPER TOOL COMPANY, Detroit.

### MINUTE MAN FLAG

COOPER-BESSEMER CORPORATION, Mt. Vernon, Ohio.

## JUST WHAT YOU NEED for RAPID INDEXING!



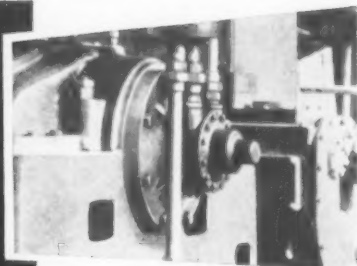
### THE HARTFORD SUPER-SPACER

The Hartford SUPER-SPACER pictured above with standard equipment of mask plates, reversible jaw, self-centering chuck, and sliding handle chuck wrench has proven to be a tool of great value for the rigid control of accurate machining. With its attachments and fixtures it is adaptable for milling, drilling, grinding, jig boring, and slotting. Simple and rugged design.

WRITE TODAY FOR COMPLETE INFORMATION!

**THE HARTFORD SPECIAL MACHINERY CO.**  
HARTFORD, CONN.

**STRIPPED  
FOR  
ACTION**

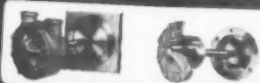


### TUTHILL

### "STRIPPED" PUMPS SAVE MATERIAL, SPACE AND MONEY

To save vital material, space and money, Tuthill offers dependable "stripped" pumps for direct incorporation into the design of the machine. Positive displacement, internal-gear, rotary type. Compact. Durable. Capacities from 1 to 50 g.p.m.

● Write for Tuthill  
Stripped Pump Catalog



Series "S"

Series "SA"

Tuthill Series S are pumps without supporting brackets, shown above. Available with automatic reversing and internal by-passing features.

Tuthill Series SA provide only the pumping elements, including gears, cover and crescent. Ideal for built-in applications where special porting is necessary or mounting space limited.

**Tuthill PUMP COMPANY**

939 EAST 95TH STREET • Chicago

OCTOBER, 1942

## Proven Performance

... in Tool Engineering  
and  
Manufacturing



- PROCESSING AND METHODS!
- JIGS . . . TOOLS DIES . . . GAGES!
- COMPLETE TOOLING PROGRAMS!
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- OVER 100 PRODUCTION MEN!
- 60 EXPERT TOOL MAKERS!
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**PRODUCTION PRODUCTS CO.**

*Engineers of Complete Tooling Programs*

104 EAST THIRD STREET • DAYTON, OHIO

### "ROCKWELL" HARDNESS TESTER



When we put our Trade Mark—"ROCKWELL"—on a hardness tester, you are assured of its quality as to both precision and durability.

380 Concord Ave.  
New York, N. Y.

**WILSON**  
MECHANICAL INSTRUMENT CO. INC.

(Continued from page 210)

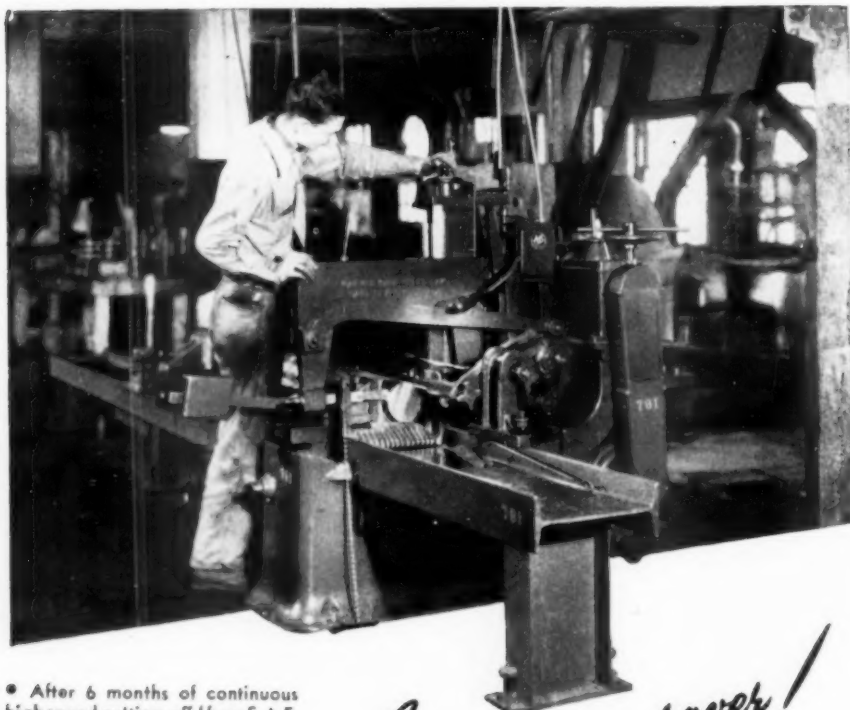
**MR. F. LLOYD WOODSIDE** became president of the Park Chemical Company of Detroit, succeeding his brother, **WILLIAM PARK WOODSIDE** who has been president since the organization of the company in 1911, and who is now chairman of the board. For the past six years **LLOYD WOODSIDE** has been connected with the metallurgical research division of the Climax Molybdenum Company and has severed his connection there to take over the Management of the Park Chemical Co.

**WALLACE T. MONTAGUE** has been elected a vice president of the Norton Company of Worcester, Massachusetts. **MR. MONTAGUE** has charge of sales planning and development at Norton Company and has held the title of assistant vice president. He is a past president of the Worcester Chamber of Commerce, and is chairman of the directors of the Grinding Wheel Manufacturers Association, and vice president of the Special Refractories Association.

**C. D. MATHEWSON**, formerly

Branch Manager and Chief Tool Supervisor with the Duncan Tool Designing Company, has severed his connections with that firm to organize his own firm known as Mathewson Tool Company at Buffalo, New York. **MR. MATHEWSON** will be president and general manager and C. F. Smallidge will be vice president and treasurer. **MR. MATHEWSON** is a member of the Buffalo Chapter of the American Society of Tool Engineers.

**WILLIAM A. MCKINLEY** has been named vice president in charge of manufacturing and sales of Midland Steel Products Company, succeeding the late Gordon Stoner. **MR. MCKINLEY** has been with Midland in engineering capacities since its organization. Previously, he had charge of manufacturing at the Detroit Pressed Steel Co., which became a part of Midland in 1923. Coincidentally, **R. C. ARTNER**, treasurer of Midland, was elected vice president in charge of financing and accounting. **MR. ARTNER** has also been associated with Midland since its inception.



• After 6 months of continuous high speed cutting-off (from S.A.E. 4150 bars heat treated to 28 Rockwell S.A.E. 4150 annealed, and S.A.E. 1335), Mr. L. S. Kirby, Superintendent of the Sidney Machine Tool Co., Sidney, Ohio, reports that his new MARVEL 9A has "given completely satisfactory service and proven to be highly efficient and a great time saver."

*A great time saver!*  
for the Sidney Machine Tool Co.

Much faster than any other accurate method of cutting off bar steel, these many-duty, all ball-bearing MARVEL Production Saws are eliminating "bottle necks" in stock rooms and cutting-off departments everywhere. Requiring no more attention than an automatic screw machine, they will cut identical lengths or slices from single or nested bars "automatically" . . . feed, measure, cut-off and stop at any pre-determined point.

No matter what your metal sawing problems, the MARVEL System of Metal Sawing supplies the best answer. The local MARVEL Metal Cutting engineer will upon request, study your requirements, and make recommendations as to methods and equipment.

**ARMSTRONG-BLUM MFG. CO.**, "The Hack Saw People" 5700 Bloomingdale Ave., Chicago, U. S. A

Buy from your local distributor

**Eastern Sales  
Offices:**  
225 Lafayette  
St., New York



**FRANKLIN G. SMITH**  
Announces New Osborn Plant

**THE OSBORN MANUFACTURING COMPANY** of Cleveland, Ohio, manufacturers of industrial brushes and foundry moulding machines, announces another addition to their plant.

**ALLEN L. MCKAY**, formerly with the Giddings & Lewis Machine Tool Company of Fond du Lac, Wisconsin, is now general manager of the Kaukauna Machine Corporation, Kaukauna, Wisconsin. **MR. MCKAY** is a charter member of the Fond du Lac Chapter of the American Society of Tool Engineers.

**CHESTER W. SMITH** has joined the staff of the Detroit Rex Products Company as research chemist in the Alkali Division. **MR. SMITH** has been a specialist in the field of electrochemistry as applied to electroplating for the past eight years. He was formerly affiliated with the J. C. Miller Company as chief chemist working on research and de-

(Continued on page 214)

**THE TOOL ENGINEER**



# RADIAL DRIVE is in the DRIVE for VICTORY

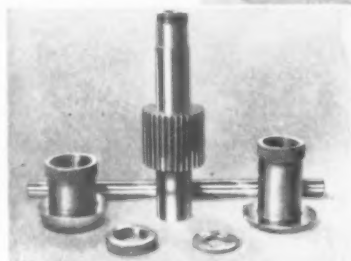
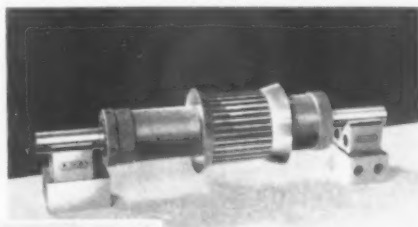


★  
ON HEAVYDUTY  
ORDNANCE AND  
AIRCRAFT  
PRODUCTION

Daily, Radial Drive is taking its place in the front lines of the nation's war manufacturing program, quickly and economically performing the toughest assignments.

**ECLIPSE COUNTERBORE COMPANY**  
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**VINCO**  
ACCURACY



To Within  
**SPLIT  
TENTHS**

Illustrated is a Vinco spline relation flush pin gage and balancing arbor for an S. A. E. 60 propeller hub. It is shown both in assembly and as individual parts.

This job called for extreme accuracy. Tolerances of every part were held to split tenths. It is typical of the work being turned out regularly by Vinco Corporation.

**VINCO**  
Corporation

9115 SCHAEFER HIGHWAY  
DETROIT, MICHIGAN, U.S.A.

OCTOBER, 1942

*Hammond*  
OF KALAMAZOO

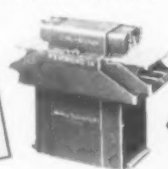
## CARBIDE TOOL GRINDERS

COMBINATION  
CHIPBREAKER-GRINDER

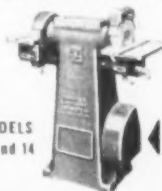
*"Keep 'em Sharp"*

WRITE TODAY FOR LATEST BULLETIN NO. 201  
MODEL 4 — Combination Chipbreaker and Grinder  
(Illustrated Upper Right)  
MODEL 6 — Carbide Tool Grinder  
MODEL 10 and 14 — Wet or Dry Carbide Tool Grinders  
with Patented No Spray-No Splash Wheel Guards  
MODEL 10A — Carbide Tool Grinder

VISIT OUR  
BOOTH D-122  
METAL SHOW  
CLEVELAND  
OCT. 12-16



MODELS  
10 and 14



MODEL  
10A

*Hammond Machinery Builders*  
INC.  
1638 DOUGLAS AVENUE • KALAMAZOO • MICHIGAN  
KANSAS BRANCH • 71 WEST 32ND STREET, NEW YORK CITY

*There is no substitute for*



*Rawhide*

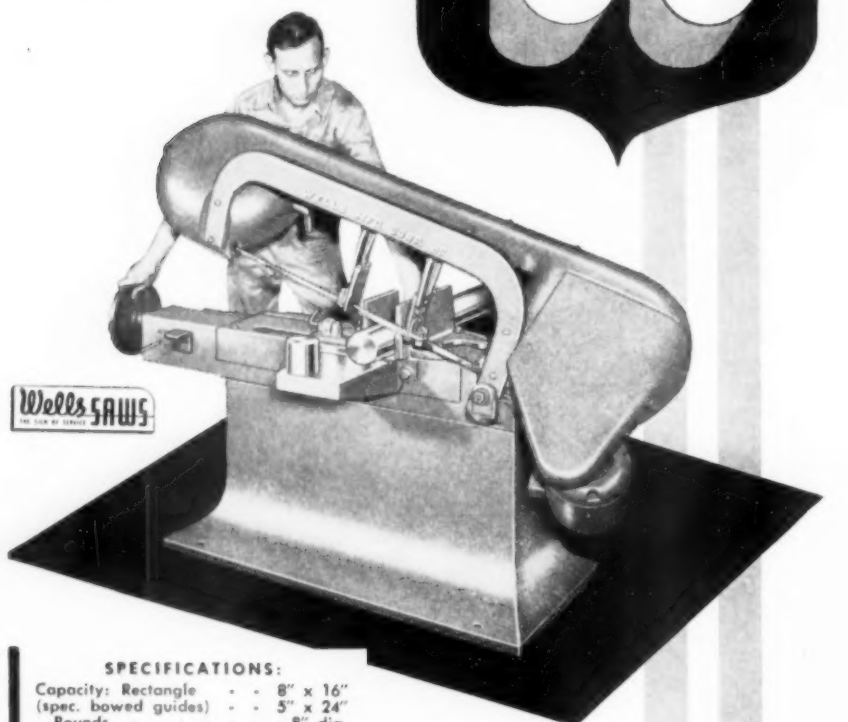
... and the hide of the Java Water Buffalo such as is used in Chicago Rawhide Hammers and Mallets is the toughest and the most enduring of all. These fine tools in sizes from 2 ounces to 6 pounds are not only long-lasting but are made to strike thousands of blows accurately and safely without damaging surfaces or materials from delicate wire insulation to heavy duty yet precision made crankshafts.

These tools, in the size you need are at your dealers.

**CHICAGO Rawhide MFG. CO.**  
139 ELSTON AVE. ★ CHICAGO, ILLINOIS.



# WELLS METAL CUT-OFF SAW SERIES 80



**SPECIFICATIONS:**  
Capacity: Rectangle - 8" x 16"  
(spec. bowed guides) - 5" x 24"  
Rounds - 8" dia.  
Speeds: ft. per min. - 60, 90, 130  
Motor - Specifications are optional

Not a new Cut-Off Saw, but an improved one—a Cut-Off Saw which embodies all the worth while improvements and features a metal cutting saw should possess.

For sixteen years Wells has been occupied with the task of building better saws and here is the latest design—an accurate, durable and economical continuous cutting machine tool.

Base or legs optional.

A large stock of blades is available at all times. Write today for full information and specifications

*Wells Has Established Leadership*

WELLS MANUFACTURING CORPORATION • Three Rivers, Michigan

# Wells METAL CUTTING BAND SAWS

## PASSING PARADE

(Continued from page 212)

velopment of materials for the field of electroplating.

**BENJAMIN F. SHEPHERD**, chief metallurgist of the Ingersoll-Rand Company will be awarded the Albert Sauvour Achievement Award at the annual banquet of the American Society for Metals, October 15th.

**EINAR ALMDALE**, for the past 15 years works manager at the Detroit plant of the Midland Steel Products Company, succeeds R. H. Wallace, as works manager of the Cleveland plant of this company. Coincidentally, John J. Boe, general superintendent of the Detroit plant, succeeds Mr. Almdale as works manager. Both men have been with the company for about 25 years, are known as progressive executives, and both are typical of what may be termed the "new" management, in that they have come up from the ranks. Mr. Boe is a member of the Detroit Chapter of the American Society of Tool Engineers.

### Died

**EDWIN L. SMALLEY**, president of the Hevi Duty Electric Company, died in Milwaukee, Wisconsin, August 29th at the age of 65. As a pioneer in the electric heat treating furnace industry,

(Continued on page 217)

### EVEREDE BORING BAR HOLDERS



The Everede Boring Bar Holders are adjustable to fit various size lathes. (Bushings are furnished with each boring bar for use in the Holders.) Everede Holders keep the boring bar in a horizontal position, regardless of any change in the size of the lathe, within limits.

The No. 1 Boring Bar Holder is used on precision bench lathes from 7" swing to and including 9".

The No. 2 Holder is used on engine lathes from 8" swing to and including 12", and the No. 3 Holder on engine lathes from 12" swing to and including 24".

The Holders are made of case-hardened alloy steel. A tool post block is attached to the engine lathe Holders by a chain as shown.

Send for descriptive folder.

**EVEREDE TOOL CO.**

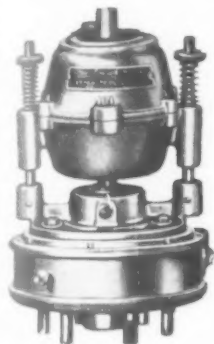
Willis Stutson

184 N. WACKER DRIVE, CHICAGO  
Representatives in principal cities

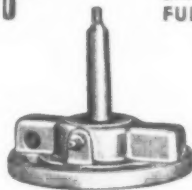
MULTIPLY YOUR DRILL PRESS  
SPINDLES MANY TIMES with

**Ettco-Emrick** INTERCHANGEABLE

### MULTIPLE DRILLING and TAPPING HEADS



Above: Drive Unit of Tapping Head with a gear case assembly attached. At Right: Drive Unit for Drilling. All gear cases are interchangeable on the two heads.



With one of the Drilling Heads clamped to a drill press spindle you can simultaneously drill from 2 to 8 holes and more, depending on hole sizes and spacing. And by a simple, quick change of driving units you can also simultaneously tap all of these holes or as many as may require tapping.

**QUILL CLAMPS** are provided which assure rigid mounting of heads on any drill press.

**FULL DETAILS** about this production-boosting system of interchangeable multiple drilling and tapping heads are given in Bulletin No. 3. Copy mailed to you on request.

★ **ETTCO TOOL CO., Inc.** ★  
586 Johnson Ave., Brooklyn, N. Y. Chicago  
Detroit, Chicago

MAKERS OF **Ettco-Emrick** DRILL CHUCKS • TAP CHUCKS  
MULTIPLE TAPPING AND DRILLING HEADS  
TAPPING ATTACHMENTS • TAPPING MACHINES

## Here's How To Get

More Efficient Tapping

At Lower Cost!



The exclusive advanced design of the new Procunier Tapping Heads assures you accurate tapping at high speeds with automatic protection for taps! Tap is driven by a double-cone, cork-faced friction clutch which automatically regulates tap driving power by pressure applied through the drill press spindle. Operators can quickly detect dull or loaded taps by the "feel", or pressure on the clutch, required to drive them thus avoiding needless tap breakage. With this sensitive Procunier smooth-operating friction clutch, bottom tapping is as simple as through tapping, since the clutch instantly slips should the tap strike bottom or stick due to tap loading.

#### External Threading

Standard Procunier Tapping Heads can be equipped for external threading. Produce accurate work and increase output.

#### SEND FOR BULLETIN

giving full details, description and prices on complete line of Procunier Precision Tapping Heads to meet all needs.

**PROCUNIER SAFETY CHUCK CO.**  
12-18 S. Clinton St., Chicago, Ill.

Send me bulletins on: ☐ High Speed Tapping Heads ☐ Tru-Grip Tap Holders ☐ Universal Tapping Machines.

Name .....

Address .....

**PROCUNIER SAFETY CHUCK CO.**  
12-18 S. Clinton St., Chicago, Ill.

## EVANS HIGH SPEED STEEL REAMERS

LOOK AT THESE  
FEATURES

- No honing.
- Will not chatter.
- Chrome-like finish.
- Perfect alignment.
- Full bearing surface.
- Left and right spirals.
- 50 to 80 thousandths expansion.
- Cannot fall in slots or oil grooves.
- Extension pilots for line-up work.

**WILL SHIP ON  
30 DAYS' TRIAL**

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CIRCULAR

**EVANS FLEXIBLE REAMER CORPORATION**

4539 Ravenswood Ave.,

Chicago, Ill.

**DIAMONDS for Victory**



Cooler dressing  
Closer tolerance:  
Micrometer Accuracy  
Because: Wing key  
heat dissipation  
and absolute diamond  
lock nib.

Send Specifications and prints for prices on turning and boring form tools.

**DIAMOND TOOL COMPANY, Inc.**  
Sheldon M. Booth, Pres.  
934 E. 41st Street CHICAGO, ILL.

• Three grades of diamonds. Common quality \$12 per karat. Medium quality \$24 per karat. Select quality \$48 per karat. (Contour template diamonds supplied only in Medium and Select quality.)

All diamond sizes 1/4 to 10 karat are nib mounted for immediate shipment... Billed subject to approval. Specify quality of diamond wanted. We recommend a minimum size of one karat for each 6" diameter of grinding wheel. (24 hour resetting service, \$1.00 post paid.) Grinders instruction card free.

### Help to Conserve

If you've recently changed your position or if your firm name has been changed, help us and the Post Office by giving us your address change at this time.

Fill in the coupon below in the interest of economy and make sure your issue of The TOOL ENGINEER reaches you promptly each month.

NAME .....

YOUR FIRM NAME\* .....

FIRM ADDRESS .....

CITY ..... STATE .....

PRODUCTS OF FIRM .....

**\*If your firm name has been changed during the past two years, please write in former name below.**





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we will send you  
a valuable booklet. No  
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9350 Grinnell Ave., Detroit

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Multi-Point, Multi-Set, Multi-  
Edge, and Single Set. Dia-  
monds for all Industrial  
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## ULTRA SURFACE FINISHING With ACCURATE SIZING And IMPROVED GRAIN STRUCTURE—ALL ASSURING MUCH LONGER LIFE SECURED BY BEARING-IZING



Tools For Straight Holes; Con-  
centric Angles, Flats and  
Contours

Also Combinations of These  
In One Tool

Ask For Information  
On Your Job

**"HOLE"** ENGINEERING SERVICE  
5901 FOURTH AVE. DETROIT, MICH.

216

# OCTOBER MEETINGS

**BINGHAMTON** — October 8. 7:30  
P. M. Sherwood Hotel, Greene, N. Y.  
Dr. Warren Brigham will be the speak-  
er. His talk will be on personnel and  
industrial relations and entitled, "Happy  
Ending".

**BUFFALO** — October 15. Lafayette  
Hotel. Principal speaker will be John  
J. Lee, assistant director of manufac-  
ture, Curtiss Wright Corporation, Air-  
plane Division.

**BOSTON** — October 8. 6:30 P. M.  
Schrafft's Restaurant. A. E. Rylander,  
industrial engineer and Technical Editor  
of the TOOL ENGINEER Magazine,  
will be the speaker. His subject will  
be, "Handy Andy Says — We'll Do  
It A Better Way".

**CINCINNATI** — October 13. 8:00  
P. M. Alms Hotel. The speaker will be  
Mr. Fred Bonte of Timken Roller Bear-  
ing Company, Canton, Ohio. His sub-  
ject will be, "Graphitic Steels".

**DAYTON** — October 12. This meeting  
will feature a lecture by the Cincinnati  
Milling Machine Company on the tech-  
niques of shell grinding.

**DETROIT** — October 8. This meet-  
ing will be held at the new home of the  
Engineering Society of Detroit in the  
Rackham Educational Memorial Build-  
ing, 100 Farnsworth Avenue. The speak-  
er will be O. W. Winter, national presi-  
dent of the American Society of Tool  
Engineers.

**FOND DU LAC** — October 9. This  
meeting will be held in Appleton, Wis-  
consin.

**HARTFORD** — October 7. 6:30 P.  
M. City Club. The technical session  
will begin at 8:00 P. M. with J. H. Van  
Deventer, Editor of IRON AGE, who  
will speak on the ways and means  
adopted by American war plants to  
increase production. Reservations: Call  
the City Club.

**MONTREAL** — October 14. The  
speaker of the evening will be Mr. E.  
V. Flanders who will talk on thread  
grinding.

**PITTSBURGH** — October 2. Speaker  
will be Mr. W. P. Powers of the U. S.  
Tool Company. His subject will be,  
"Multi Slide Machines", and includes  
movies of the machine.

**ROCKFORD** — October 8. 7:15 P. M.  
Dinner. Faust Hotel, Earle Bucking-



## JUNKIN PRESS GUARD

- ★ Maximum protection for your  
men, and your profits
- ★ Increased press production
- ★ Lower insurance costs
- ★ Finer plant morale

Write For  
Power Press Protection

**JUNKIN SAFETY APPLIANCE CO., Inc.**  
930 W. HILL ST. LOUISVILLE, KY.

## IMMEDIATE DELIVERY

### AUTOMATICS

Brown & Sharpe No. 00 Cut-off  
Cleveland, 7/8, 1-1/16, 1/2 & 2/2" Model B  
Gridley, S.S. 2/4, 3/4 and 4/4"  
Nos. 22, 23 & 24 New Britain  
No. 5A & 6A Potter & Johnston

### GRINDERS

No. 6, 15 & 18 Bryant Internal  
10 x 36" Landis Hydraulic, M.D.  
10 & 14 x 36" Norton Plain, M.D.  
2" x 8" Storm Piston  
Lapper, 26" Bethel-Player

### LATHES

Lodge & Shipley 16" & 8" M.D.  
Schumacher & Boye 18" x 8" c/shaft

### MILLING MACHINES

No. 3 Garvin Plain, M.D.  
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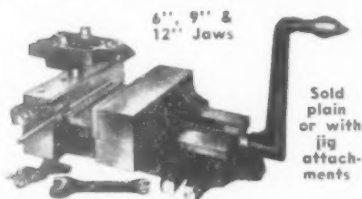
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THE TOOL ENGINEER

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## MEETINGS

ham, Associate Professor of Engineering, (Standards and Measurements), Massachusetts Institute of Technology, will be the speaker of the evening and will talk on gears. Reservations: Allis Chalmers, Main: 6720, 610 Gas-Electric Building.

**SCHENECTADY** — October 8, 6:00 P. M. Ten-O-One Veteran's Hall. Plastics and national defense will be the theme of the talk to be given by Dr. H. A. Frommelt. Reservations: N. Y. Coxe, Room 235, Building 41, General Electric Company.

**SOUTH BEND** — October 13. Indiana Club. Dinner at 7:00 P. M. and the technical session at 8 P. M.

**SYRACUSE** — October 13. Speaker of the evening will be A. E. Rylander of Detroit, Technical Editor of The TOOL ENGINEER Magazine and an industrial engineer, who will talk on "Handy Andy Says —We'll Win the War with Tools." Onondaga Hotel.

**WORCESTER** — October 6. Mr. George Sanborn of Fellows Gear Shaper Company will talk on cutting gears and other parts with a reciprocating generator tool. The talk will be illustrated with lantern slides.

(WESTERN MICHIGAN) **GRAND RAPIDS** — October 12. Mr. Herman F. Zorn of the V & O Press Company will talk on, "Presses Geared for War".

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## PASSING PARADE

(Continued from page 214)

he was the holder of a considerable number of furnace patents.

**MR. FREDERIC BOYES**, factory manager of the Wells Manufacturing Company, died suddenly in a Fond du Lac hospital. Mr. Boyes was a charter member of the Fond du Lac Chapter of the American Society of Tool Engineers.

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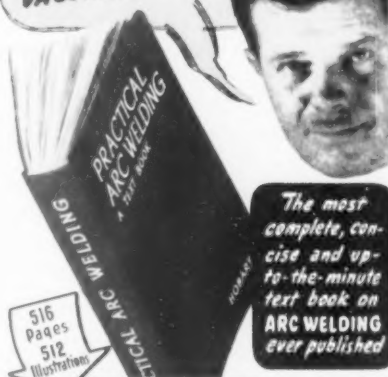
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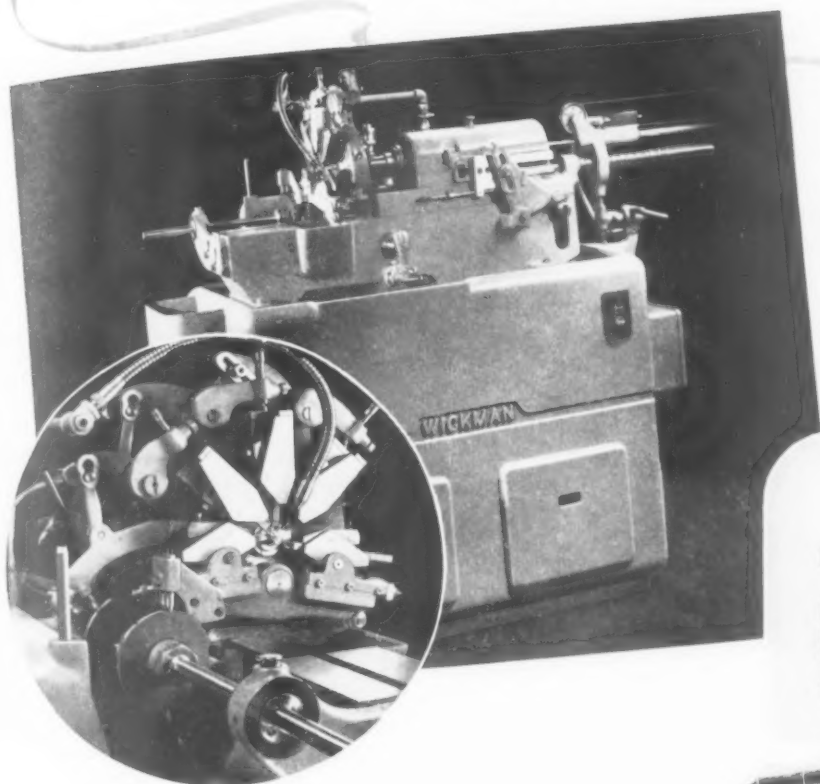
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**On Work  
Up to 1/2" Diameter  
and 4" Length**



Part—3/4" long—six diameters—  
1/2" to 3/16"  
Material—S.A.E. 1114 Steel  
Production—100 per hour  
Tolerance— $\pm 0.0003$ " on all diameters  
Finish—30 to 50 Micro inches



Part—3" long—twelve diameters  
and two pivot points between 7/16"  
and 3/16"  
Material—Black—Red Stainless Steel  
Production—14 per hour  
Tolerance— $\pm 0.0003$ " on all diameters  
Finish—15 to 40 Micro inches



Part—3-7/8" long—five diameters be-  
tween 1/4" and 5/32", two under-  
cuts, one taper  
Material—Black—Red Stainless Steel  
Production—24 per hour  
Tolerance— $\pm 0.0003$ " on all diameters  
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Pictured in actual size are three parts, each completed in one operation on the WICKMAN High Precision Automatic. They are typical of many small, accurately finished parts which can be produced from bar stock on a high production basis.

Five individually cam-fed single point tools are employed. All tool holders are provided with both radial and lateral micrometer adjustments. By synchronizing the sliding headstock movement with the radial strokes of the tool slides, there is no limitation to the back shoulder work which can be done. 28 spindle speeds up to 7000 R.P.M. and infinite feed rates are available.

Various attachments for drilling, threading, tapping and slotting may be furnished. Write for full details.

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CORPORATION

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DETROIT, MICHIGAN

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OCTOBER, 1942

219

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CALL A  
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PRODUCTION!"



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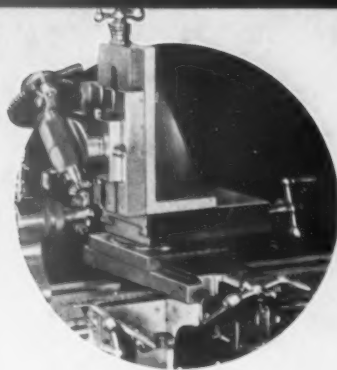
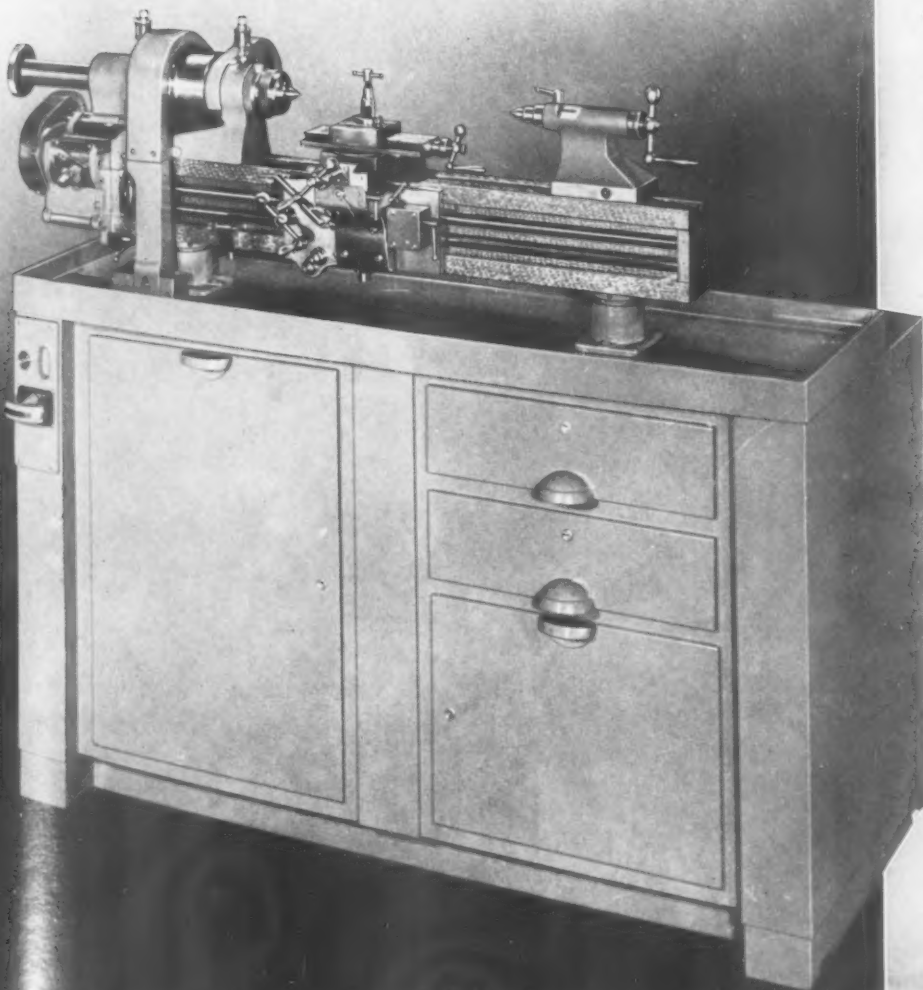
# RIVETT

## 608 WITH VEE BELT DRIVE

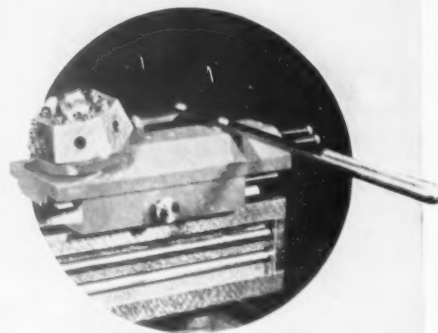
In Tool-Making and Instrument Shops It Will Handle Great Variety of Jobs in Minimum Time

Basically, the Rivett No. 608 is a small but exceedingly powerful engine lathe. As such it is peculiar in having slide areas equal to those of lathes twice its size. Its bronze-bearing spindle runs smoothly and with extreme truth, and is capable of heavy or light cuts and severe end thrusts. Finely made attachments for milling, spiral cutting, slotting, relieving, taper turning, ball turning, grinding, forming and multiple operations enable the use of a fully equipped No. 608 to finish his work completely without recourse to other machines, and throughout his entire series of operations to utilize the inherent precision of the lathe itself.

Safety interlock protects the carriage from accidental engagement of both power feed and lead screw at one time. Lead screw and feed rod are guarded from injury by deeply inset mounting in bed. Carriage wipers sweep dirt and chips from the bearing surfaces of the bed. Three-point pedestal supports assure against distortion imparted from lathe mount.



Milling



Multiple Operations

### SPECIFICATIONS

#### With Flat or Vee Belt Drive

Swing over bed, dia. .... 8 1/2"  
 Length of bed ..... 40"  
 Distance between centers ..... 18 1/4"  
 Collet capacity, max. dia. .... 1"  
 Step chuck capacity, max. dia. .... 6"  
 Jaw chuck capacity, max. dia. .... 6"  
 Spindle capacity, max. dia. .... 1 1/2"  
 Slide rest, travel of top slide .... 5 1/4"  
 Slide rest, travel of cross slide .... 4 1/2"  
 Feed range, through gear box  
     .0015" to .0220"  
 Thread range, through gear box  
     10 to 144  
 Tailstock spindle travel ..... 3 1/4"  
 Spindle speeds:  
     Flat belt drive—12 speeds  
         39 to 1295 r.p.m.  
     Vee belt drive—12 speeds  
         25 to 1500 r.p.m.  
 Weight of lathe, mounting and drive:  
     Flat belt drive, net ..... 900 lbs.  
     Vee belt drive, net ..... 1050 lbs.



For Further Description  
 Write for Bulletin 608

608

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BENCH

LATHE

# RIVETT

## LATHE & GRINDER INC.

BRIGHTON, BOSTON, MASS.

PIONEERS IN BENCH LATHE DEVELOPMENT



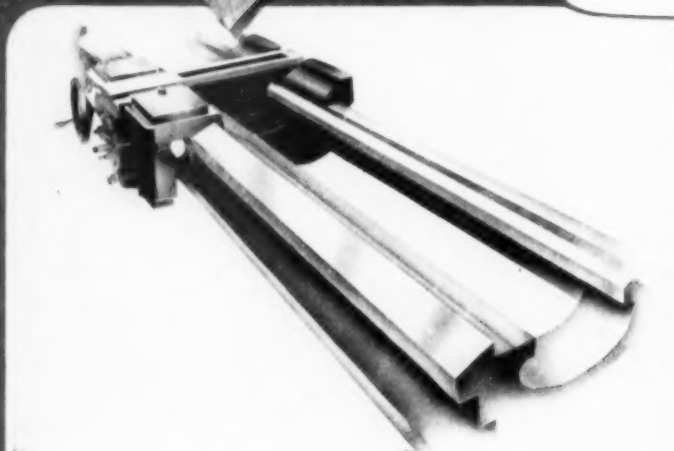
# "I'm Tellin' You."

(No. 2 in a series of tips on "Keeping 'em Turning")

By Lou Hornberger — 40 years with LeBlond



Seeing as how I've been helping to build LeBlond Lathes for 40 years now, the boss figured I ought to have a few ideas about how to take care of them. So I'm supposed to spout off a little to you fellows who are running them to help you "Keep 'em Turning". I've got a pet theory that I can pretty well size up a lathe operator with just a quick look at the bed and carriage of the lathe he has been running...



When a LeBlond Lathe... leaves our plant, the bed looks like this — all accurately scraped and polished.



But if the operator plays the "Village Blacksmith", using the bed or carriage for an anvil to drive mandrels in and out, and if he uses it as a rack for hammers, wrenches and chucks...



... it won't be long before he pounds out the accuracy or wrecks the lathe by feeding the carriage against an obstacle lying between the carriage and headstock.



The smart operator has a board at the tailstock end for his tools. He keeps the bed free of heavy turnings and wipes the shears clean with oil. Easy things to remember, but mighty important.

## The R.K. LeBlond Machine Tool Co.

CINCINNATI, OHIO

LARGEST MANUFACTURER OF A COMPLETE LINE OF LATHES

